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THE ROLE OF AGRICULTURE COOPERATIVES AND FARMER ORGANIZATIONS ON THE SUSTAINABLE AGRICULTURAL PRACTICES ADOPTION IN UGANDA

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*“Para todos la luz, para todos todo, nada para nosotros”
Mexican traditional motto*

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List of abbreviations

AES	Agro-Environmental Schemes
Agri-coops	Agricultural cooperatives
CBO	Community Based Organization
CIAT	International Center of Tropical Agriculture
CLE	Cooperative Leadership Event
DFID	Department for International Development
DIFA	Ddwaniro Integrated Farmers Association
EDC	Enhancing Development through Cooperatives
FAO	Food and Agriculture Organization of the United Nations
FOs	Farmer Organizations
GDP	Gross Domestic Product
GOU	Government of Uganda
ICA	International Cooperative Alliance
IFAD	International Fund for Agricultural Development
ILO	International Labor Organization
IMS	Impact Monitoring System committee
KOPGA	Kalangala Oil Palm Growers Association
KOPGT	Kalangala Oil Palm Growers Trust
MTIC	Ministry of Trade, Industry and Cooperatives in Uganda
NAADS	National Agricultural Advisory Services of Uganda
NARO	National Agricultural Research Organization
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
OPUL	Oil Palm Uganda Limited
PRA	Participatory Rural Appraisal
SACCO	Savings and Credit Cooperative society
SAPs	Sustainable Agricultural Practices
SDGs	Sustainable Development Goals
SLF	Sustainable Livelihoods Framework
UCA	Uganda Cooperative Alliance
UN	United Nations
USDA	United States Department of Agriculture
VFGs	Village Farmer Groups
VODP	Vegetable Oil Development Project

Abstract

“The role of agriculture cooperatives and farmer organizations on the sustainable agricultural practices adoption in Uganda”

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Sustainable agricultural practices (SAPs) are crucial to reduce soil degradation, soil erosion, water depletion and lack of moisture in the crops, improving productivity, reducing poverty and food insecurity that affects millions of households in Uganda. The adoption of SAPs is an interdependent and multivariable process due to numerous factors which determine the decisions to use them, and the decisions vary from farmer to farmer. The SAPs adoption rate remains low; therefore it is extremely important to find proper mechanisms to increase their implementation. Among different determinants of adoption, agricultural cooperatives (Agri-coops) and farmer organizations (FOs) stand as an important factors that show a significant correlation of SAPs adoption rates due to their dependence in natural resources-based activities and their organizational nature. This master thesis contributes to the literature by examining the functions and features of Ugandan agriculture cooperatives and farmer organizations that influence the SAPs service provision among their members and analyze how to improve its impacts. The research encompasses a statistical analysis from ninety-nine cooperative leaders' survey and two case studies conducted at Uganda as a part of the project Enhancing Development through Cooperatives (EDC) under the International Center of Tropic Agriculture (CIAT). Descriptive statistics results show that only in 8.1% of the organizations answered that their justification is aligned with the better management of their natural resources; and just 6% of the organizations answered that their main objective is related with environmental sustainability issues. The Poisson regression analysis shows a significant level of correlation between the number of SAPs services provided by the organizations with information access; external support; autonomy; organization size and the perception of the soil and water problems. The case studies highlight the importance of an organizational structure based on committees and farmer groups that disseminate information, monitor and supervise their SAPs implementation. In addition the case studies show the importance of external support to provide reliable information and means to provide more services. Moreover, the creation of revolving loan schemes and savings and credit cooperative societies (SACCOs) to finance the investment of SAPs implementation are crucial for the adoption rates of SAPs among their members. The study suggests a shift from the “new cooperative model” to a “holistic cooperative model” approach that can balance the economic, social and environmental services of the farmer organizations and contribute to solve the inequality, poverty, food insecurity and environmental degradation problems of their members.

Keywords: Agri-coops, farmer organizations, sustainable agricultural practices, functions, features, services, adoption, Uganda.

Chapter I Introduction

1.1 Background

The republic of Uganda is located in East Africa and embraces more than 34 million inhabitants, and once known as the pearl of Africa, is one of the most diverse and richest natural resource base countries (Musimami, 2012). According to the national development plan (IMF, 2005); Ugandan livelihoods largely depend on agri-goods and services production. The national government bases its policies on environmental and natural resources endowments in order to promote economic and social development. However, around 46% of Uganda's land and soil is degraded (FAO, 2013). The poor management of their soil with improper nutrient management and the lack of capital and labor to invest in sustainable soil management creates soil fertility losses, resulting in low yields and low quality of the production. At the same time, the lack of conservation practices such as: mulching, fallow, soil retention structures and organic fertilizers increase soil erosion, landslides and agrochemical pollution decreasing soil productivity, reducing the income among the farmers and increasing food prices (Saito, 2007). Uganda loses around 17% of its gross domestic product (GDP) annually as a consequence of soil degradation and 11% of the losses came from soil erosion (FAO, 2013; Amanigaruha & Manyindo, 2010). In addition, the inefficient implementation of mechanisms that promote a watershed management plan with conservation practices, that can reduce the soil erosion and decrease the water consumption in agriculture, increase the degradation of soil and water Uganda's endowments (FAO, 2013). It is necessary to implement measures and mechanism that promote and adopt SAPs among farmers and it has to be a national priority in the country to achieve sustainable development (Asafu-Adjaye, 2008).

Different adoption authors and theories have been trying to provide a better understanding of the main process and variables affecting the farmer innovations adoption process, concluding that not common paths, theories and determinants can fit to all the possible farmer characteristics, preferences and context combinations for their adoption decisions. Nevertheless, the only consistent factor that seemed to influence in a positive and significantly level the adoption process is a membership in an Agri-coops or FOs. According to Cato (2009), social groups where members are part of the decision making process are less likely to behave in an ecological destructive way. Agri-coops and FOs guarantee the natural resources preservation through the setting of property and user rights, diversifying their production systems, getting stewardship certifications as well as providing internal rules and regulations on the production practices (ILO, 2015; Renting & Van der Ploeg, 2001). At the same time, cooperatives and self-help organizations are participatory platforms that find local environmental solutions to their concerns, promoting the responsible use of agricultural inputs and helping in the diffusion of technical agricultural innovations to improve the production efficiency (Abate et al., 2014). Ostrom (2004) argued that Agri-coops and FOs have the collective action power to reduce inefficiencies associated with market-led economies, centralized governments, social injustices and environmental side effects. However, in practice nobody seems able to make them work as is expected (Salifu & Francesconi, 2010). In order to understand the role of Agri-coops and FOs, specifically in the adoption of SAPs, it is necessary to stop looking at these organizations as black boxes and try to understand the underlying problems that remain unknown, to look not only the production and marketing information but also to look inside them and understand the

complexity of their functions and features (Ostrom, 2004; Cook & Chaddad, 2000; Borzaga & Galera, 2014).

This study looks at Agri-coops and FOs as bottom-up organizational strategies that have the dual nature of self-help groups and business enterprises which can contribute to reduce the natural resources depletion, especially soil and water resources. Using collective action and economic theory, the study defines and analyzes the internal functions and characteristics that can have a positive correlation to increase the number of services provided regarding sustainable agricultural practices among their members.

1.2 Statement of the problem to solve

Since the 1990s, a new wave of researchers has been trying to improve the economic performance of the new revitalized African Agri-coops and FOs movement after the market liberalization policies. However, these approaches fail to look at the importance of the social and especially environmental relations and impacts in their service provision. The necessity to focus on the endogenous functions and features of Agri-coops and FOs that contribute to the adoption of sustainable agriculture practices among their members are crucial in order to ensure an efficient, profitable and sustainable production and to extend the organization life cycle.

1.3 Aims of the study

The aim of this study is to close the literature gap and analyze the role of Agri-coops and FOs in the SAPs adoption process. The paper focuses on the identification of main functions and features that influences the successful performance of these organizations for the SAPs adoption in Uganda.

1.4 Objectives of the study

In order to accomplish the aim of the study three aspects are important to understand. First of all, it is significant to explore if the participants of this study, in this case ninety-nine Agri-coops and FOs leaders are aware of the situation of the soil and water resources in the members' farms and if they have knowledge about SAPs. The second objective is to investigate which are the features and characteristics of the Agri-coops and FOs that are influencing the services provision for the adoption of SAP's among its members. Finally, it is necessary to analyze the context, challenges and strengths of Agri-coops and FOs in Uganda in order to make recommendations to increase the SAPs services provided to their farmers members. A summary of the objectives is presented.

- Recognize if Agri-coops and FOs leaders who are aware of the situation of the soil and water resources and received trainings influence the service provision for the SAPs adoption.
- Identify which of Uganda's Agri-coops and FOs functions and features influence the services provision for the adoption of SAPs.
- Make recommendations to improve the adoption of SAPs using the services provided by Agri-coops and FOs.

1.5 Research questions

The study intends to analyze the influence of several organizational functions and features in the SAPs service provision. The following questions have to be answered by a qualitative and quantitative approach:

- Are Agri-coops and FOs whose leaders were trained on SAPs and who are aware about soil and water problems faced by their members more likely to provide more services for SAPs adoption than otherwise?
- Which functions of the Ugandan Agri-coops and FOs have a significant influence in providing more services for the adoption of SAPs?
- Which Agri-coops and FOs features have a significant influence in providing more services for the adoption of SAPs?
- What changes have to be done in Agri-coops and FOs and their context in order to achieve the adoption of SAPs?

1.6 Research hypothesis

In sequence to explain the role of Agri-coop and FOs on the SAPs adoption processes in Uganda, four main assumptions were established.

- Agri-coops and FOs whose leaders recognize problems faced by their members' farms regarding soil and water and know about SAP are more likely to provide more services for the use of SAPs among their members.
- Agri-coops and FOs who access to information, set rules/norms, have social capital, access to external support and ensure inclusiveness among their farmers are more likely to provide more services for the use of SAPs among their members.
- Agri-coops and FOs who have a specialized governance structure, autonomy, with a particular size, skilled leaders and a sustainable justification are more likely to provide more services for the use of SAPs among their members.
- Changes in the internal Agri-coops and FOs characteristics and features have to be aligned with external context in order to increase the adoption rates of SAPs.

“The role of agriculture cooperatives and farmer organizations on the sustainable agricultural practices adoption in Uganda”

#	Research Objectives	Research questions	Research Hypotheses
1	Recognize if Agri-coops and FOs leaders who are aware of the situation of the soil and water resources and received trainings influence the service provision for the SAPs adoption.	Are Agri-coops and FOs whose leaders were trained on SAPs and who are aware about soil and water problems faced by their members more likely to provide more services for SAPs adoption than otherwise?	Agri-coops and FOs whose leaders recognize problems faced by their members' farms regarding soil and water and know about SAPs are more likely to provide more services for the use of SAPs among their members.

Identify which Uganda's Agri-coops and FOs functions and features influence the services provision for the adoption of SAPs. 2	Which functions of the Ugandan Agri-coops and FOs have a significant influence in providing more services for the adoption of SAPs? Which Agri-coops and FOs features have a significant influence in providing more services for the adoption of SAPs?	Agri-coops and FOs who access to information, set rules/norms, have social capital, access to external support and ensure inclusiveness among their farmers are more likely to provide more services for the use of SAPs among their members. Agri-coops and FOs who have a specialized governance structure, autonomy, with a particular size, skilled leaders and a sustainable justification are more likely to provide more services for the use of SAPs among their members.
Make recommendations to improve the adoption of SAPs in Agri-coops and FOs. 3	What changes have to be done in Agri-coops and FOs and their context in order to achieve the adoption of SAPs?	Changes in the internal Agri-coops and FOs characteristics and features have to be aligned with external context in order to increase the adoption rates of SAPs.

Table 1. Objectives, hypothesis and research questions.

1.7 Significance of the study

Half of the world's population lives in rural areas, most of them depending on farm livelihoods, with an important number living below the poverty line and most of them depend on natural resources assets (Altieri, 2002; Adams, 2006; Fereres, 2005; IFAD, 2001; Campbell et al., 2014). This is also the case of Uganda population, where the natural resource degradation is affecting the farmers' production, increasing the food insecurity, poverty and inequality (Musimami, 2012; FAO, 2013). It is claimed that farmer organization membership is a crucial factor that increases significantly the adoption of innovations among its members (Singh et al., 2015; Wollni & Andersson, 2013; Ndonkeu et al., 2015; Haghjou et al., 2014; Tosakana et al., 2010; Ngwira et al., 2014; Mequaninte et al., 2015; Abate et al., 2014). However, it is surprising that there are not studies that look inside these organizations and provides an overview of the main characteristics that influence the SAPs process. The importance of this study relies on its contributions to strengthen the role of these local organizations for the improvement of the agricultural practices adoption among their members. Specifically, the study seeks to fill the understanding gaps about what Agri-coops and FOs functions and features can do and how

regarding SAPs implementation. Finally, this research tries to provide inputs for policy makers, researchers, extension services, non-governmental organizations (NGOs), cooperatives members, finance organizations, universities, students and rural developers for the better understanding, support, collaboration and coordination with Agri-coops and FOs on the SAPs adoption process.

1.8 Limitations of the study

The results of this study were based on ninety-nine surveys and two case studies in the context of the Cooperative Leadership Event (CLE) in Kampala, Uganda, organized by CIAT. The respondents were Agri-coops and FOs leaders that came from ninety-nine different Agri-coops and FOs in Uganda. The objective was to obtain data from these organizations regarding organization context, structure, and services and marketing performance. However, this research was done under certain limitations. First of all, the sampling was based on “key cooperative development agencies” criteria to invite the organizations to assist to the CLE. Consequently, the organization sample does not represent statistically the national situation of the Agri-coops and FOs of Uganda. Secondly, each organization selected the person who participated in the CLE survey. Therefore, the survey answers represent the particular knowledge, experience and perceptions of the organization representative and the results could vary depending on the member selection. It is also important to understand that the survey priority was not focused on SAPs but in other topics, constraining the number of straightforward SAPs questions that could facilitate the data analysis and the interpretation of the statistical results for this study.

To overcome the study limitations the survey was reviewed by several researchers in order to improve the understanding of the topics and questions of the survey. The researcher sent in advance an identical survey to the organizations invited in order to familiarize them with the questions and the information that they had to provide regarding his/her organization. It was informed to the “key cooperative development agencies” to invite organizations from different areas and different ages in order to diversify the sample. There were hired local master students for the CLE in order to facilitate the comprehension of the survey with the participants during the CLE. The researcher was supervised all the time by an experienced researcher during the data collection process in order to avoid data errors. Finally, the study also applied qualitative data through two case studies in order to have a confirmation and better understanding in the field from two Agri-coops and FOs leader’s answers collected in the survey.

1.9 Structure of the study

This study is divided into six chapters. The first chapter introduces the research problem to solve and set the objectives, hypothesis and research questions. This is followed by a second chapter in which the literature review related with the research topic is discussed. The third chapter presents the conceptual and theoretical frameworks that the research is based on. Chapter four presents the research design and methodological approach. The data analysis and presentation of results are discussed in chapter five. The last chapter summarizes the research process, the thesis results, and provides final conclusions, recommendations and suggestions for future research.

Chapter II Literature review

2.1 Cooperatives: a first insight

2.1.1 Background

The cooperative movement has its roots in the eighteenth century, when a group of weavers called the “Fenwick Weavers’ Society” created collective contracts in Scotland in 1761 in order to get collective purchases of yarns and clothes with a price discount (ICA, 2016). During the nineteenth century different people organizations from Asia, Europe and North America started to obtain collective benefits from its collective purchases, selling’s and savings activities (Ibidem). However, it was until 1844 when the “Rochdale Pioneers”, a group of artisans who faced terrible work conditions and low wages decided to pooled their resources and work together. The group created alternatives to provide high quality products and used their profits to assist the community. Then, every customer of the store become a member of the group with the right to receive benefits according to their participation in the shop and had rights in the democratic decision making of the business. The Rochdale Pioneers set the basic principles which characterized the modern prototype of cooperatives as most of the people know them today (Ibidem).

2.1.2 The concepts

Since the nineteenth century different definitions and terms have been used to identify member-owned, member-run and member-serving businesses which provide collective market power and human and social capital for the promotion of community development (Grace, 2014). However, for the analytical purpose of this master thesis all the cooperative terms and definitions used as reference of an ideal cooperative will be based on the International Cooperative Alliance (ICA) and the terms “Agri-coops” and “FOs” will be used to embrace other agricultural self-help farmer groups terms used in the literature such as: farmer associations, producer organizations, community based organizations and rural producer organizations.

ICA is a non-governmental organization that was created in London in 1895 as an apex organization for cooperatives worldwide. Currently, the alliance represents 292 members’ organizations, from 95 different countries, representing more than one billion individuals (ICA, 2016). In 1995, ICA formulated the “Statement on the Cooperative Identity” which provides the most used definition, values and principles that characterized modern cooperatives at the present time.

2.1.2.1 Definition

According to ICA, a cooperative is “...an autonomous association of persons united voluntarily to meet their common, economic, social and cultural needs and aspirations through a jointly owned and democratically-controlled enterprise.” (ICA, 2016).

2.1.2.2 Values

The cooperative organizations are based on self-help, democracy, self-responsibility, solidarity, equity and equality values. However, the ethical values practiced and promoted by the

cooperatives members also include honesty, openness, social responsibility and caring for others (Ibidem).

2.1.2.3 Principles

ICA identified and proposed seven principles to help the implementation of the cooperative values (Ibidem). These principles are:

1. Voluntary and open membership. The organization avoids any kind of discrimination among of their voluntary activities and services.
2. Democratic member control. The organization decision making process is based on same voting rights; one member equal to one vote.
3. Member economic participation. Each member contributes with patronage for the organization development.
4. Autonomy and independence. Independent control of the organization from governments and external organizations in the decision making and its activities.
5. Education, training and information. The organization provides knowledge to its members, representatives, managers and employees for the efficient performance of the cooperative. Involving information sharing to the general public about the cooperative activities and benefits.
6. Cooperation among cooperatives. The organization serves its members and also strengthens the collaboration with other cooperatives, organizations, and governments at the local, regional, national and international level.
7. Concern to the community. The organization ensures the sustainable development in their communities through activities, services and internal policies approved by its members.

2.1.3 The cooperative peculiarity

Despite the proposal of the seven principles made by ICA, different authors and farmer organizations argued that cooperatives, also called patron-own firms, have three fundamental principles which differentiated from investor own firms (USDA, 2012; NCBA, 2016; Hanisch & Opperskalski, 2010). These principles are:

- The user-benefits principle. The organization priorities are to solve member interest and necessities. Opposite to traditional business which main goal is the profit maximization, the main benefits of cooperative membership are mostly represented through services, inputs, access to markets and lastly through proportional distribution of the cooperative profits.
- The user-owner principle. The users of the cooperative are its owners. The use of patronage instead of capital to run the organization. Opposite to invested own firm enterprises which owners and users are not the same.
- The user-control principle. The democratic decision making process in which every member has voice and vote rights in the general meetings is independently from its contributions to the cooperative. Organization structures formed by board of directors, committees, employees and managers are in most of the cases members of the cooperative. Opposite to firms in which the owner of the capital control the decision making process.

Besides these clear distinctions in the principles of cooperatives organizations other particularities can be observed. The first one is that cooperatives are part of the community livelihoods strategies, not external organizations imposed to the communities (NCBA, 2016). Another characteristic of these organizations is that patron owned-firms decrease the agency costs but increase the decision making costs (Francesconi, 2016; USDA, 2012; NCBA, 2016).

These special features distinguish and rule the cooperative organization generating a dual nature in their activities: a social group and an enterprise. On one side, the social group uses the self-help organization to break down vicious cycles faced without depending on any external help (ICA, 2016). It is widely proved that direct help over vulnerable groups improve situations in terms of poverty, food security, income, environmental issues and climate change in specific circumstances (Cato, 2009). In order to overcome the reliance on the external aid, the strength of the self-help organizations is based on their values, rules, members rights, active participation and organization structure to create plausible, durable and effective solutions through collective action (Gibson et al., 2005). On the other hand, cooperative organizations embrace enterprise activities that try to generate a comparative advantage in order to compete for a market position (USDA, 2012). A lot of successful cases in different parts of the world show that cooperatives can generate turnovers similar to any private corporation in the same economic activity (Ibidem).

However, it is important to mention that the success of cooperative organizations both as self-help and business group it is not correlated with the amount of cooperative principles complied with in international cooperative apex organizations (Hanisch & Opperskalski, 2010). In fact, there are some organizations that are not registered as cooperatives, but which comply with more principles than official registered cooperative organizations. In addition, the particular regional or country condition creates the legal and institutional environment in which organizations will work and where they will take their major characteristics and features to survive (Ibidem). Therefore, the differences among cooperatives and similar self-help and enterprise organizations inside the same country or geographical region are enormous. The latter is the reason to take into consideration different legal names as synonyms of the cooperative organizations for this study.

2.1.4 Cooperatives current situation

The growth of the cooperative movement has increased enormously since the creation of the first member-own, member-run and member-serving business in Scotland. Cooperatives are now classified in four different types such as: consumer, producer, worker and shared services cooperatives. Nowadays, there are about 2.6 million cooperative organizations registered in 145 different countries on the planet (Grace, 2014). These cooperatives have more than one billion members around the world (Grace, 2014; ICA, 2016). In addition, the worldwide cooperative movement generates more than 250 million direct and indirect employees (ICA, 2016). Just in the G-20 group, cooperative employment represents 12% of the total employed population on those country members (Ibidem).

Regarding economic performance, the world's 300 largest cooperatives generated together more than 2 trillion USD of revenues in 2012 (Grace, 2014; ICA, 2016). Besides, cooperatives continue providing the services necessary for the community development, 16% of the total

population have a direct relation with a cooperative as a cooperative client or having a cooperative membership (Ibidem). In addition, the top 6 most cooperative economies are also ranked among the 12 first spots of the “Social Progress Index” which measure basic human needs achieved and opportunity and access to information (Grace, 2014). Different functions of cooperative were evolved and created in the last two hundred years to satisfy certain activities and services such as: production, nature conservation, farm inputs, credits and savings, insurance, electricity, machinery services, labor, housing, irrigation, agriculture, processing and marketing. It is estimated that agricultural cooperatives share over 32% of the global market of the agricultural sector (ILO, 2015).

The United Nations (UN) declared in 2012 the international year of cooperatives due to the potential role of cooperative organizations for the economic and social development of people (UN, 2012). In the same year, the UN conference on sustainable development Rio +20, acknowledged the important function of cooperatives and self-help organizations on sustainable development. During the following months half of the cooperatives members of the International Labor Organization (ILO) were consulted in the debate of the post-2015 development agenda to contribute in the creation of the UN Sustainable Development Goals (SDGs) (ILO, 2015).

2.1.5 Agri-coops and FOs, their role on the management of natural resources

In order to solve the global environmental crisis face in the XXI century, it is to necessary achieve the democratic control over natural resources recognizing new organizational models based on sustainability and based on the participation and implementation of community groups (Mensah & Camargo, 2004). Cooperatives and self-help farmers’ organizations stand as one of the main actors that best meet the economic, social and environmental sustainability agenda because their ethos and structure seek to meet their social, cultural and economic needs ensuring environment protection (Cato, 2009; ILO, 2015). According to Cato (2009), social groups where members are part of the decision making process are less likely to behave in an ecologically destructive way. Agri-coops and FOs guarantee natural resources preservation through the setting up of property and user rights, diversifying their production systems, getting stewardship certifications as well as providing internal rules and regulations on production practices (ILO, 2015; Renting & Van der Ploeg, 2001).

At the same time, cooperatives and self-help organizations are participatory platforms to find local environmental solutions to their concerns, promoting the responsible use of agricultural inputs and helping in the diffusion of technical innovations that improves the production efficiency (Abate et al., 2014). In countries like the Netherlands, Germany and Australia; Agri-coops are becoming an important actor to negotiate collective environmental management contracts which at the same time convert them in an effective means to self-regulate the farming practices of their members (Renting & Van der Ploeg, 2001; Prager & Vanclay, 2010). Farmer organizations not only have the potential to lead the sustainable management of natural resources but also its governance model is showing positive impacts in sustainable development through the transparency, participation and cooperation with local communities, enterprises and local and international governments (ILO, 2015; Cato, 2009).

Despite the benefits of these organizations in the sustainable management of natural resources, some researchers showed that Agri-coops are failing to promote environmental friendly practices especially if the practices require periodical investments (Rodrigo, 2013). In addition, some articles argue that FOs are the main contributors of the unsustainable use of the natural resources due to the improvement of market access increases the intensive production systems pushing the use of natural resources to levels beyond their regeneration capacity rates (Mojo, 2015; Stellmacher & Grote, 2011). Natural resources depletion problems put in risk the organization production to supply market demands. This situation generates losses in profits and decreases the number of services and benefits provided by the organization to its members. After failing to provide their services, FOs convert to inactive organizations or empty shells waiting for external support and if they fail in the funding collection they cease of exist (Francesconi et al., 2015; Meinzen-Dick, 2009). This situation is creating the necessity to make an effort and analyze Agri-coops both as self-help organizations and business organizations that have to balance the social, economic and environmental objectives and solve several social dilemmas in order to succeed. The Nobel Prize winner, Ostrom (2004), argued that cooperatives have the collective action power to reduce inefficiencies associated with market-led economies, centralized governments, social injustices and environmental side effects. However, in practice nobody seems able to make them work as is expected (Salifu & Francesconi, 2010).

2.2 Sustainability, sustainable development and sustainable agriculture

2.2.1 The concepts

The word sustainability has its origins from the Latin word “sustinere” than means “to hold” or “to support” and it was first mentioned for environmental purposes by the German silviculturist Hans Carl von Carlowitz in 1713 in his book “Sylvicultura Oeconomica” using the term sustainability to describe a minimal condition to have proper management that prevents the degradation of forestry resources (Carlowitz & Rohr, 1713; Schader et al., 2014). Two centuries later, in 1969 the mandate of the world’s oldest and largest global environmental organization, the International Union for Conservation of Nature (IUCN), spoke about the management of natural resources to achieve the highest “sustainable” quality of life (Adams, 2006). After that, several definitions were added to the concept in order to promote the world’s development without environmental damages covering a broad and complex range of ideas (Ibidem). In 1972, the declaration of the UN conference on the human environment in Stockholm discussed the main ideas to promote the preservation of human environment, but it was not until 1987 when the report “Our common future” published by the World Commission on Environment and Development (WCED) when the sustainability concept was popularized (Ibidem). The WCDE commission was created to address the concerns of environment and natural resources degradation and its consequences to economic and social development (Drexhage & Murphy, 2010). The commission reports also known as “The Brundlant Report” provided the classic definition of sustainable development as: “...*development that seeks to meet the need and aspirations of the present without comprising the availability to meet those of the future.*” (WCED, 1987, p.41). Even though the Brundlant definition was smart, holistic and attractive it was found inexact, vague, imprecise and without consensus about operational meaning due to it not provide specific goals and its meaning differed from space and time between individuals; making a complicated process for its implementation (Adams, 2006; Rigby et al., 2001; Drexhage & Murphy, 2010). However, The Brundlant Report definition of sustainable development set a precedent for the Food and Agriculture Organization of the United Nations

(FAO) council definition of sustainable development in 1989, who defined it as: “*The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fishery sectors) conserves land, preserves water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.*” (FAO, 2016a). With this background the United Nations Conference on Environment and Development (UNCED) in Rio in 1992 set the principles of sustainable development (Drexhage & Murphy, 2010). These principles were adopted by 150 nations and covered more than a hundred specific programs for attainment sustainable development, climate change and biodiversity conservation (Hagedorn, 2015; Adams, 2006). These principles were followed by the Millennium Development Goals (MDGs) in 2000 and the world summit on Sustainable Development in Johannesburg, South Africa in 2002. The latter was less spectacular than the Rio conference and the countries who participated just signed a declaration with thirty-seven points, committing themselves to work to achieve sustainable development (Ibidem). In September 2015, the UN launched seventeen, not legally binding, goals signed by 193 world leaders committed to end extreme poverty, fight inequality and injustice and fix climate change in the next 15 years based on sustainable development approach (UN, 2016). Without a doubt sustainable development is the paradigm of the XXI century that tries to rule human civilization actions towards to economic, social and environmental perpetual wellbeing (Drexhage & Murphy, 2010).

2.2.2 The dimensions of sustainable development

The concept of sustainability and sustainable development represent three aspects, pillars, or dimensions (Adams, 2006; Drexhage & Murphy, 2010). Sustainable development tries to merge the interaction, interdependence and integration between economic, social and environmental affairs to achieve a fair future for next generations (Ibidem). Therefore, sustainable development involves getting balanced solutions taking into account the trade-offs among these three categories (Mensah & Camargo, 2004). Different frameworks were created starting with these three categories approach, as the Munaninges’ triangle which relates the interactions between the aspects and its functions (Ibidem).

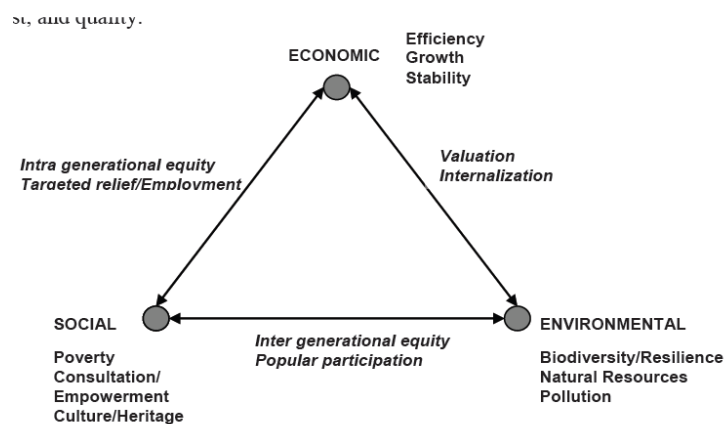


Figure 1. Daly's triangle of equity, economy and environment.

Source: Mensah & Camargo, 2004.

Other framework created is the business model called “Triple bottle line” with three E’s that summarize economy, environment and equity with a middle zone of sustainability (Ibidem).

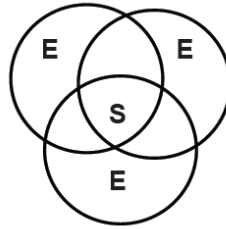


Figure 2. Economy, environment and equity with a middle zone of sustainability.

Source: Mensah & Camargo, 2004.

A third framework is the three concentric circles, where the economy is part of society and economy and society are part of the environment. In this model the sustainable development relies on the extent where the borders are respected (Ibidem).

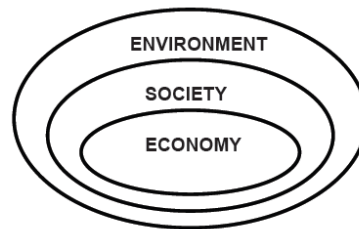


Figure 3. Sustainability measure as a whole concept.

Source: Mensah & Camargo, 2004.

The final framework presented was developed by the economist Herman Daly, who created a triangle divided in three levels where the bottom level was set by the environment that represent the natural resources as a precondition for dignified life. The second level is the economy and engages technology, politics and ethics and it helps to link the environment with ultimate ends. The top level is equity or which Daly called the ultimate end referring to human wellbeing. Daly argues that a successful economy conserves ultimate means and enables ultimate ends (Ibidem).

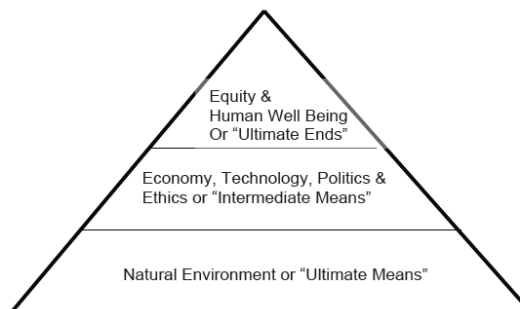


Figure 4. Daly’s triangle of equity, economy and environment.

Source: Mensah & Camargo, 2004.

Despite the different efforts to explain sustainable development, decision makers seem to misunderstand the concept and put more emphasis on the economy than the other pillars (Adams, 2006). Thus, the idea of sustainability is still linked to economic rationality and infinite

growth (Mensah & Camargo, 2004). Besides, economic growth had proved that wealth increases in developed countries have a relation with the depletion of natural resources in other part of the world (Drexhage & Murphy, 2010). It is important to remember that the economic system is an invention of society; meanwhile the environment was created and evolved from natural processes independently from human decisions, having limits in time, space and growth (Adams, 2006). However, the term sustainability is also used in a business perspective meaning that an enterprise can economically sustain itself for a period of time and provide development to a society (Schader et al., 2014). Nowadays, the environment pillar is taking an important role for government and business and continues to be rated the most important concerns for many people in the world (Drexhage & Murphy, 2010). The first idea of sustainability appeared more than 300 years ago; however, the climate change problem that the world is facing now showed that efforts on this subject have not been addressed enough and more structural changes are necessary. Therefore, is important to create new mechanisms that require dialogue, trust and cooperation that not exist on today's society (Ibidem).

2.2.3 The Sustainable Agriculture concept context

Agriculture is a particular human activity that plays an important role on sustainable development due its dependency on natural resources to produce goods and services and its economic role to preserve human society. Agriculture activity is one of the important factors that shape the life conditions on this planet. More land was converted to agriculture on the period 1950-1980 than the 150 year period from 1700-1850 (Adams, 2006). Around 40% of world land surface is affected by land degradation having consequences on the poorest farmers estimated at more than one billion people (IFAD, 2001). The consumption of water from lakes and rivers doubled since 1960 where most of the irrigation systems are used inefficiently causing salinization and waterlogging (Adams, 2006; Pretty, 2007; Fereres, 2005). The flows of nitrogen doubled and the phosphorus tripled since 1960; 50% of the nitrogen fertilizer ever used has been used since 1985 and 60% of it ends contaminating water systems, the atmosphere and increasing the incidence of disease vectors (Pretty, 2007; Adams, 2006). These environmental changes are happening more rapidly than human society reaction capacity (Adams, 2006). Since the 1960's the world food production increased 145% and in Africa increased 140%; however by 2050 it will be necessary to increase by 60% the actual food production to carry on the life of nine billion people (Krall, 2015; Pretty, 2007; Campbell et al., 2014). In general terms the world food production per capita increased 20% in the last forty years despite the 70% population increase, this increase in food production moved people out of poverty but the negative effects of the human ecological footprint on earth increased as well as the hunger incidence (Fereres, 2005; Pretty, 2007). Today, between 800 and 1,400 million people from rural areas depend on natural resources and environmental services to survive and are living with less than 1 USD per day and suffering from hunger and having a lack of credit, information and services related with agricultural practices (Altieri, 2002; Adams, 2006; Fereres, 2005; IFAD, 2001; Campbell et al., 2014). Water scarcity and lack of water access affects more than 1 billion people (Adams, 2006). Food production in Sub-Saharan Africa is declining, creating an increase on land pressure, causing a reduction in soil fertility and production and strengthening the cause-effect spiral between poverty and natural resources degradation (Adams, 2006; IFAD, 2001). In the particular case the population growth in Uganda is expected to increase from thirty-four millions in 2013 to 95 millions in 2050 implying a lot of challenges in the agriculture sector in the country (Amatheon, 2015). Besides population growth another phenomenon that is happening is

the migration to urban areas and the increase of incomes that led to consumer behavior changes on diets and increasing demands on meat, cereals, fruits and vegetables, treating the food security and the global food prices (Pretty, 2007; Fereres, 2005; Campbell et al., 2014). More than two millions of hectares are lost globally every year due to change in land use patterns (Fereres, 2005). In 2015, the UN launched the SDGs which seek to solve and eradicate the sustainable problems that the world is facing today by 2030. The goal number two aims by 2030 “...end hunger, achieve food security and improved nutrition and promote sustainable agriculture.” (UN, 2016). This goal based its success on two targets that are focused on increasing the sustainability of food production that can be resilient to climate change and improving the land and soil quality. The second target is oriented on enhancing agriculture extension services and adopting measures for the proper functions of food commodity markets (Ibidem). Taking all these previous points into account, the implementation of actions such as deforestation reduction, land use planning, and improving agricultural methods and practices are crucial to improve the conditions of the environment and counter balance climate change, natural resources depletion and produce the agriculture goods and services to keep all kinds of life on this planet. In order to achieve this, it is necessary to execute actions that are aligned with the sustainable concept in general and sustainable agriculture in particular.

As happened with the “sustainability” concept, many thoughts and ideas were developed in the last decades regarding sustainable agriculture and sometimes the term differs among people, regions and countries (Slabe et al., 2013). Most of these ideas focus on agricultural practices, methods and technologies that do not have any negative effects on the environment (climate, soil, water, air, biodiversity and human health), are effective and accessible to farmers, have an ecological and biological holistic approach, increase productivity, uses improved technology and have positive effects on the goods, services and externalities (Pretty, 2007; Krall, 2015; Campbell et al., 2014; Slabe et al., 2013). At the same time some sustainable agriculture concepts refer to the reduction of inputs based on non-renewable resources, focus on local conditions and necessities, ensure food sovereignty, promotes resilience, reduce farmer’s vulnerability and encourage producer’s collective action participation, and the use of knowledge and skills of farmers for production process decision making (Altieri, 2002; Pretty, 2007; Krall, 2015; Campbell et al., 2014; Slabe et al., 2013). In addition, according to Pretty (2007) sustainable agriculture not only has to involve a better understanding of ecological and agronomic management but also has to be concern about energy flows, nutrient cycling and control population measures. According to Slabe et al. (2013) and Rigby et al. (2001); the sustainable agriculture concept is also seen as a philosophy, a process and a life style rather than specific practices; however, this philosophy and process have to seek the sustainable use of natural resources first, and then has to be followed by economic benefits and social support. In order to implement correct agricultural practices and methods it is necessary to understand that new paradigms have to emerge. Social capital configurations with new interactions between organizations, institutions and individuals based on trust, commitment and horizontal and vertical partnerships are necessary to achieve sustainable agriculture (Pretty, 2007). In addition, human capital embracing leadership and management skills are crucial for innovation in times of risk and uncertainty (Ibidem). A highly agriculture sustainability rate relies on making the best use of natural resources goods and services without damaging these assets, and these circumstances can change from farmer to farmer and even in different points of time; therefore

it does not exist a universal solution that fits all the agriculture conditions and situations (Slabe et al., 2013; Rigby et al., 2001).

One of the most used definitions of sustainable agriculture was developed by the American government in the 1990 farm bill that defined it as: *“...an integral system of growing plants and breeding animals, according to the geographic characteristic of the farming area which in the long term enables the sufficient amounts of food for humans and animals, the enhanced environment and natural resources which are crucial for agriculture, most optimal use of non-renewable resources and the resources on farms, natural biological processes, economic vivacity of farming and it improves the quality of life of farmers and the overall society.”* (USDA, 2016). There are also environmental economist and resource economist approaches that frame agriculture sustainability in terms of production, stock and yields that are aligned with the sustainable concept and defined it as a state in which: *“...resources are managed to maintain the production opportunities for the future, natural capital stock is not declining through time, resources are managed to maintain a sustainable yield of resource services, and satisfies minimum conditions of eco-system stability and resilience through time.”* (Muthukrishnan, 2015, p.138). Generally, the international sustainable indexes help to make comparisons between different agricultural practices and most of these indexes focus on four parameters: natural resource conservation, ecological balance, biodiversity conservation and environmental friendly technologies (Slabe et al., 2013). However, these indexes require time and money to monitor and evaluate the effects of the different agricultural activities (Rigby et al., 2001).

2.3 Sustainable Agricultural Practices (SAPs)

2.3.1 The concepts

Nowadays, there is a plenty of evidence from several agricultural practices initiatives that fit with the sustainable development and sustainable agriculture concepts. Most of these practices can be sorted in five agricultural measures (Pretty, 2007). The first kinds of practices are related with integrated pest management, and basically seek to avoid the use of pesticides and herbicides in order to conserve the biodiversity and resilience of the land and the environment (Ibidem). The second group is related with the integrated nutrient management and aims to fix nitrogen to the soil without adding any other organic and inorganic source of nutrient (Ibidem). The third measure is associated with soil mechanization and focus on measures that replaces ploughing the soil, reducing or eliminating tillage in order to maintain the natural soil structure and soil moisture (Ibidem). The fourth group concerns systems to combine plants and trees in the same plot in order to provide the more natural and efficient nutrient and energy cycles flows and carbon balances (Ibidem). Finally, the last group is related with water and soil conservation techniques and is based on a series of structures that allows harvesting water and preventing wind and water soil erosion (Ibidem). The benefits of these measures can be seen in the production yields but generally take some years and external support in terms of money, information and awareness to ensure successful transition from unsustainable to sustainable agriculture (Ibidem).

Several sustainable agriculture practices are popularized all around the world promoting the groups of measures for different sustainable farming methods that include SAPs. This section will present a brief summary of the most important sustainable agricultural concepts:

-Sustainable Intensification (SI). This concept was developed to solve the problem of extensive farming. SI focuses on the idea to intensify the use of natural, social, human and physical capital in order to produce less greenhouse emissions per unit of output (Pretty, 2007; Campbell et al., 2014). In other words, the concept tries to increase the yields, preserving the role of soil and water, eliminating the damage to the environment through resource efficiency and preserving the biological diversity in the agriculture system (Campbell et al., 2014). Even though some researchers think that SI concept is a contradiction in terms, the followers of this concept argue that the objectives promote fundamental issues such as: diversified farming systems, local adaption, animal welfare and human nutrition (Ibidem). In order to reach those objectives SI bases its success on the following components: soil quality and biodiversity management; moderating the hydrological cycle; carbon sequestration; resilience to drought and flooding; and the oxygen-plant nutrient cycle (Ibidem). Some of the practices promoted that help to reach the SI objectives are: stone bunds along contours; shallow bowls filled with organic matter; and reforestation. Combining these three practices the production yields increases; the soil erosion is reduced; the farmer's harvest water; the soil fertility improves; and the groundwater levels increase (Ibidem). At the same, time these benefits help farmers to increase their production with the same amount of resources, increasing their income and improving their diet (Ibidem).

-Integrated Soil Fertility Management (ISFM). The main objective of this concept is to optimize crop production; maximizing the interactions between the use of germplasm (seeds), fertilizers and organic inputs, and associating them with the farmers knowledge under the particular local context (Hershey & Neate, 2013; Roobroeck et al., 2015). The main indicator of this concept is the agronomic efficiency generated by the relation between food production per unit of input used (Roobroeck et al., 2015). The specific practices that ISFM promoted are: the use of improved and healthy seed varieties that resist pest and diseases; correct use of fertilizers requirements (right rates, right time and right place); the use of organic residues (mulching and composting); application of missing nutrients; deep tillage practices; correct agronomic practices (crop densities, spacing and intercropping arrangements); erosion control measures; and the use of herbicides and pesticides that tackle pest and diseases in the crop production (Hershey & Neate, 2013; Roobroeck et al., 2015).

-Agroecology and Permaculture. The concept of agroecology seeks that farming practices mimic the functions of the local ecosystems, resulting in agriculture reproducing natural models that can be efficient, productive and resilient to satisfy human needs (Altieri, 2002). Meanwhile, the concept of permaculture is defined as: *"The philosophy that works with, rather than against, nature; of protracted and thoughtful observation rather than protracted and thoughtless action; of looking at systems in all their functions, rather than asking only one yield of them; and allowing systems to demonstrate their own evolutions"* (Cato, 2009, p.48). These terms have several principles that are based on sustainable concepts such as: the use of renewable resources; minimize toxics; conserve natural resources (soil, water, energy, genetic resources and capital); management of ecological relationships; adjusting to local environments; and diversifying landscapes and biota (Gliessman, 1990; Cato, 2009). In order to achieve these principles agroecology and permaculture promote different practices such as: recycling organic matter; use of natural nitrogen fixation; intercropping; mulching; reduce of chemicals or synthetic products; reduce or zero tillage practices; use of irrigation systems; creation of buffer zones; crop rotation; contour planting; strip tillage; the use of endemic resources; and the

production of endemic goods and services (Altieri, 2002; Fereres, 2005; Gliessman, 1990; Cato, 2009).

-Organic farming. This concept was developed more than seventy years ago and different approaches were set; however, organic farming practices are the unique sustainable practices codified in the United States Department of Agriculture (USDA) (Rigby et al., 2001). USDA set a list of farming practice rules in order to be certified as an organic farming producer that includes: preserve natural resources and biodiversity; support animal health and welfare; provide access to the outdoors so that animals can exercise their natural behaviors; only the use of approved materials is allowed; do not use genetically modified ingredients; receive annual onsite inspections; and separate organic food from non-organic food (USDA, 2015). In order to accomplish that rules there were defined a set of organic crop production practices to follow such as: soil fertility practices (uses of compost, manures, cover crops, mulches, contour plowing and strip cropping); seeds and planting stock (organic seeds, no genetic modified seeds, and non treated seeds); crop rotation; managing pests; weeds and diseases (releasing predatory insects, mulching against weeds, and natural pesticides and insecticides); and maintaining identity and integrity of organic crops (prevent contact between organic and conventionally-grown crops as well as pesticides and fertilizers, prohibited materials cannot be applied 36 months before the harvest in order to be identified as a organic crop) (Ibidem).

-Good agricultural practices (GAPs). As a response to generate international regulations and standards, different international organizations have developed the GAPs guidelines. According to FAO, the good agricultural practices “...address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products.” (FAO, 2008). Generally, the GAPs objectives are based on a sequence of production activities as: crop rotation; land preparation (tillage); plant nutrient requirements; agronomic techniques (density, arrangement); weed, pest and disease control; water management; and irrigation practices (Poisot et al., 2004)

-Sustainable Agriculture techniques (SATs). As well GAPs, SATs also resulted from an initiative of the Union of Concern Scientist of United States of America (UCSUSA) to generate a guide of objectives and practices to achieve sustainable agriculture production. UCSUSA provides a synthesis of their research on SATs and involve practices such as: crop rotation; cover crops; soil enrichments; natural pest predators; and integrated pest management (Ibidem).

-Sustainable Agricultural Practices (SAPs). This term is used generically by different NGO's, organizations and institutions and often is referred to promoting the long term fertility and productivity of soil at optimum and viable profit levels (FAO, 2016b). The main objectives of this movement are: to match the supply of soil nutrients with the nutrient demands of the crop through efficient nutrients management instead chemical fertilizers (using animal and vegetal manure, compost, mulching, intercropping, cover crops and agro-forestry); pest control through crop rotation and bio-control agents; maintenance of soil physical properties through soil conservation practices (strips, contour farming and check dams); and elimination of soil disturbance (reducing tillage or zero-tillage is recommended) (Ibidem).

-Conservation Agriculture (CA). This concept is another term used by organizations and other actors to promote sustainable and profitable farming practices that improve the livelihoods of farmers using three basic principles: minimal soil disturbance; permanent soil cover; and crop rotations (FAO, 2015a). These kinds of practices are recommended to farmers who have a lack of labor due to these practices are less labor intensive (FAO, 2015a; CU, 2015). At the same time, farmers using conservation agriculture practices use low-cost tools, equipment and increase the use of traditional seeds varieties that are more resistant to pests and diseases (CU, 2015). The main agricultural practices promoted by conservation agriculture movement are: zero-tillage; conservation tillage (around 30% of land is covered by plant residues); direct planting (no preparing the land by any mean); cover crops; and the use of synthetic chemicals as fertilizers; herbicides and pesticides.

Taking the previous information into account, a table with all the agricultural practices from different sustainable agricultural concepts is presented in order to define which specific practices are the most promoted and use those as a reference for this master thesis.

#	Agricultural Practices	SI	ISFM	Agroecology and Permaculture	Organic farming	GAP	SAT	SAP	CA
1	Soil and water conservation structures (stone bunds, contour farming, terraces, and check dams)	✓	✓	✓		✓		✓	
2	Use of organic matter (composting, manuring)	✓	✓	✓	✓	✓		✓	
3	Intercropping (agro-forestry included)	✓	✓	✓				✓	
4	Genetic modified or improved seeds		✓						
5	Endemic seeds use			✓	✓	✓			✓
6	Correct application of chemicals (fertilizers, herbicides and pesticides)		✓						✓
7	Avoid application of chemicals (fertilizers, herbicides and pesticides)			✓	✓	✓	✓		
8	Tillage practice		✓				✓		
9	Reduce or zero-tillage			✓		✓		✓	✓
10	Cover crops			✓	✓	✓		✓	✓

11	Mulching	✓	✓	✓	✓	✓
12	Irrigation systems		✓		✓	
13	Buffer zones		✓			
14	Crop rotation		✓	✓	✓	✓

Table 2. Sustainable agriculture concepts and their agricultural practices.

Source: Author's compilation from literature review.

Table 2 shows that among the eight different concepts or ideas discussed on how sustainable agriculture should be, there are four-teen different agricultural practices mentioned. Among these practices there are six of them that contradict each other: improved seeds against endemic seeds, efficient use of chemicals against eliminating the chemicals use and tillage against reduce tillage or zero-tillage. The latter means that the maximum number of practices that one farmer can apply are eleven. In fact, the only concept which reaches the maximum number of sustainable agricultural practices is the Agroecology/Permaculture concept with eleven. In addition, the sustainable intensification ideology was the lowest concept recommending only three over eleven practices. Finally, there were nine practices which reached more than four mentions from all the different concepts consulted and it is important to mention that SAPs concept embraces seven of them. For this reason it was decided to use the SAPs concept to refer to the following practices for purposes of this study: soil and water conservation structures, use of organic matter (composting and manuring), intercropping, reduce or zero-tillage, cover crops, mulching and crop rotation.

2.3.2 SAPs adoption: theories review

According to Ngwira et al., (2014) and Wollni & Andersson, (2013), adoption of SAPs have the potential to improve resilience to climate change, address soil degradation and increase agricultural production in an efficient, productive and profitable way; breaking the vicious cycle of poverty and natural resources degradation. Researchers have tried to understand and explore the factors that influence the adoption of new agricultural practices among farmers since the 1950's; however, farmer behavior is very complicated to predict and the adoption rates remain very low (Haghjou et al., 2014; Teklewold et al., 2012; Roufahi, 2015). The adoption of SAPs is an interdependent and multivariable process due to numerous factors determining the decision to use them and the decisions vary from farmer to farmer (Long, 2003). In order to have a better understanding of the variables that influence the farmers' adoption process, a summary of main adoption theories is presented.

The development of different theories helps to understand farmers' adoption process that is necessary to focus on. There are already some approaches that frame the basic process and elements related with the adoption of these practices, and we can classify them as individualistic and constructivist theories (Ngwira et al., 2014). The individualistic approaches are aligned with neoclassical economy theories and assume that farmers are rational individuals with personal, economic and environmental goals to meet (Tosakana et al., 2010) and are associated with a set of personal preferences, utility maximization and with complete access to information (Ngwira et al., 2014). The person will adopt a new action only if the new practice is perceived superior to its predecessor, it is easy to get information about it and it is easy to test it (Ibidem). On the

other hand, the constructivist theory is based on the premise that farmers are members of a society and the way that they understand and behave in the world is mainly influenced by primary and secondary social relations interactions where all the values and principles shared in a society are collectively constructed (Mequaninte et al., 2015; Ngwira et al., 2014).

The sociological diffusion model or diffusion of innovations is an individualistic adoption approach and states that farmers must identify a problem and know how to solve it in order to adopt a specific practice (Long, 2003). This theory follows a linear process: knowledge, persuasion, decision, implementation and confirmation (Ngwira et al., 2014). Under this model, the key factor for the adoption decision is based on access to information, where the extension services play a fundamental role for the knowledge dissemination (Long, 2003). This theory concluded that the farmer will take a decision of adoption only when he/she realizes and learns about a new practice that will be useful in the short and long term to solve his/her problem. Time later he/she will decide to implement it and test it; and finally he/she will modify it or reject it, depending on his/her results (Prokopy, 2014; Napier, 2001). The second individualistic theory is the adopter-perception perspective model, and determines that the perception of change is fundamental for the adoption of a new technique (Ngwira et al., 2014). The farmer's perception is explained by personal characteristics such as: age, educational level, farm experience, etc; and physical factors such as: land characteristics and organizational factors (Long, 2003). The result of the adoption decision will depend on the combination of these characteristics.

The social learning theory is based on constructivist approach, and basically says that people learn from social networks and try to behave in ways that comply with the society's rules and norms (Mequaninte et al., 2015). Therefore, the only actions that will prevail on individuals will be necessarily only the ones that ensure rewards and avoid punishments (Ibidem). In addition, the adoption of a new individual practice has to reflect better personal benefits than the previous practice (Long, 2003; Mequaninte et al., 2015; Napier, 2001). In this model, the formal and informal social networks are crucial to learn from past experiences and strengthen the social norms, values, beliefs and the individual and social preferences. The learning process is based on the interaction with friends, neighbors, relatives and organizations relationships. (Ngwira et al., 2014; Mequaninte et al., 2015). Recently, the development of new models such as the structural theory, which focuses on the barriers for the adoption process; and the holistic adoption model, that combines both individualistic and constructivist theories with structural theories, helped to highlight more factors that are necessary to understand the adoption process (Long, 2003).

The presentation of the most important theoretical models for the adoption process suggest that personal preferences; personal characteristics; access to information; problem perception; social relations; networks; a trial phase and the learning process are basic characteristics that are necessary to take into consideration when a researcher wants to make a study regarding the adoption of a new technology or practice.

2.3.3 SAPs adoption: determinants review

Besides different adoption theories, there are several scientific studies that tried to explain which determinants influenced in a significant level the SAPs adoption among farmers. A

significant number of these variables are repeated in different articles; sometimes they show consistencies and sometimes show contradictory results among each other. A summary of main adoption factors found is presented.

Different researches explained that information and knowledge is one of the key determinants for new agricultural practice adoption. Even though most of the researchers found this determinant crucial, the opinions differed when they try to explain which information source is the most important. Family and kinship relations are crucial for the positive dissemination of SAPs and its adoption (Wollni & Andersson, 2013; Haghjou et al., 2014; Teklewold et al., 2012; Prokopy, 2014). However, Long (2003) and Mequaninte et al. (2015) did not find a clear correlation between family sources and practices adoption, actually they found that depending on the type of practice in some cases the family relation influences negatively the rate of adoption. In addition, friends and neighbors were found as significant factors for adoption process (Wollni & Andersson, 2013; Mequaninte et al., 2015). Finally, other sources of information such as NGOs, extension services, international organizations, traders and input dealers also influenced positively the rates of adoption (Teklewold et al., 2012; Asafu-Adjaye, 2008; Ndonkeu et al., 2015; Ngwira et al., 2014; Roufahi, 2015; Mequaninte et al., 2015; Prokopy, 2014). Other determinants that the theories talk about and different researches confirm its importance are the perception and attitudes factors. Some authors claimed that the perception of a specific agricultural problem influenced significantly the rates of adoption of a new practice (Wollni & Andersson, 2013; Haghjou et al., 2014; Asafu-Adjaye, 2008). Others, classified the perception as the perception of effectiveness of the new practice as crucial for implementation (Ngwira et al., 2014; Tosakana et al., 2010). Another group of authors claimed that attitudes regarding the conservation of environment and the maintenance of the natural resources for future generations have the same importance in the adoption process as perception (Prokopy, 2014; Andrews et al., 2013; Ngwira et al., 2014). However, Long (2003), points out that the method of analysis selected by the researcher can change the statistical results and as happened in her research, the author did not find a significant result between stewardship attitudes and adoption rates.

Another group of important factors that influenced the adoption of agricultural practices was clustered in the requirements of the agricultural practices. Factors like time needed for the execution of the practice, human capital, labor required, the cost of the new practice, equipment and inputs required, feasibility and simplicity of its operation and the correlation with other SAPs affect significantly the degree of adoption among the farmers (Prokopy, 2014; Tosakana et al., 2010; Teklewold et al., 2012; Ngwira et al., 2014; Roufahi, 2015; Long, 2003). At the same time, it was found that there are specific incentives or benefits related with new practices that increases the rates of its adoption. Better yields, labor savings, soil fertility increases, soil erosion control, soil moisture increases, achieving food security and better earnings were the most important benefits associated with practices adopted (Tosakana et al., 2010; Ngwira et al., 2014). Finally, among the most important reasons for not adopting new agricultural practices were: lack of information, lack of labor, individualistic behavior for sharing the positive externalities with their neighbors, lack of long-term and landscape planning and the lack of awareness that there is a problem with their natural resources (Ngwira et al., 2014; Teklewold et al., 2012; Prokopy, 2014; Wollni & Andersson, 2013; Tosakana et al., 2010; Mequaninte et al., 2015).

Other important determinants to adopt agricultural practices reviewed were related with the farmer characteristics. Age is one of the most tested factors and its influence for SAPs adoption is still contradictory. Some authors claimed that the older the farmer the more reluctance to adopt a new practice (Singh et al., 2015; Teklewold et al., 2012; Asafu-Adjaye, 2008; Ndonkeu et al., 2015). On the other hand, Long (2003) explained that the age factor is no significant due to older farmers could also have more networks and free time to try new practices in their plots. Another factor that has contradictions among the literature reviewed is the level of education of the farmer. Asafu-Adjaye (2008) argued that the more educated the farmer more easily they adopt new agricultural practices, however Haghjou et al. (2014), found that this correlation is actually negative. Finally, several researchers found that educational level does not have a significant influence (Tosakana et al., 2010; Roufahi, 2015; Long, 2003). Experience of the farmer was also tested as an influential factor and it was found significantly important by Ngwira et al. (2014) but not significant by Tosakana et al. (2010). Unexpected significant results such as: spouse education, a woman being a head of the household, household size and agriculture as the primary activity of the head of the household, were found to have significantly influence the adoption process (Long, 2003; Teklewold et al., 2012; Asafu-Adjaye, 2008).

Regarding the farm characteristics, previous researches identified several important physical characteristics that influence the adoption of agricultural practices. First of all, the farm size was supported as a significant factor, when the size of the farm is large it increases the probability to adopt a new practices (Asafu-Adjaye, 2008; Ndonkeu et al., 2015; Haghjou et al., 2014; Prokopy, 2014; Tosakana et al., 2010). But it was founded without any significant level by Long (2003) and Ngwira et al. (2014); according to them, the smallholders actually are more aware about the conditions of their resources and are more willing to change their practices than big farmers. At the same time, specific conditions as soil type, topography, temperatures, rainfall, geographic location and closeness to markets, specific districts and research centers were found important during the adoption process (Asafu-Adjaye, 2008; Ngwira et al., 2014; Teklewold et al., 2012; Tosakana et al., 2010; Roufahi, 2015). Another important factor analyzed was the property rights of the farmer, having the property right of the land increases the possibility of adopting new agricultural practices (Teklewold et al., 2012; Haghjou, 2014; Tosakana et al., 2010; Ngwira et al., 2014; Mequaninte et al., 2015; Roufahi, 2015). Another unexpected factor found was livestock property, some practices related to replacing synthetic fertilizers with manure requires livestock to facilitate the adoption of these practices (Singh et al., 2015; Teklewold et al., 2012; Mequaninte et al., 2015).

Other determinants are related with economic factors involved in the farming practices. The role of income or household wealth affects drastically the rate of adoption of agricultural practices. Non-farm income, net farm income, specialized contracts, price premiums, economies of scale, agglomeration of economies, financial capital, the value of the assets and middle man price offered are the most important economic factors that influence significantly the adoption rates (Roufahi, 2015; Teklewold et al., 2012; Asafu-Adjaye, 2008; Ngwira et al., 2014; Tosakana et al., 2010). Another important aspect was the practicing of commercial or subsisting farming. Ndonkeu et al. (2015) and Ngwira et al. (2014) argued that commercial farming influence positively the adoption rates; however, Long (2003) found that subsisting farming influences positively the adoption rates and commercial farmers behave reluctant due to the lack of short-

term benefits of these practices. Asafu-Adjaye (2008) did not find significant correlations between production systems and adoption rates.

Finally, the last cluster of factors is related with government, external services and collective action factors. Government rules and regulations trust in government, government subsidies government grants, and educational government programs play a positive role for the adoption decision (Teklewold et al., 2012; Roufahi, 2015; Haghjou et al., 2014; Tosakana et al., 2010; Long, 2003). External services in the form of extension services, technical assistance, and technical centers play one of the most important roles for the adoption (Haghjou et al., 2014; Tosakana et al., 2010; Ngwira et al., 2014; Roufahi, 2015; Asafu-Adjaye, 2008). At the same time grants, funds and donations from NGOs or other institutions also play a significant role for the adoption process (Haghjou et al., 2014). Active participation, trust, collaboration, the compliance of traditional norms or social conformity, the importance to cope with risk collectively and the neighbor acceptance are the factors that influence significantly the adoption of these practices (Prokopy, 2014; Wollni & Andersson, 2013). However, Wollni & Andersson (2013) and Mequaninte et al., (2015) also found that the fear of free riding of their neighbors make them not comply with collective agricultural practices measures, decreasing the adoption rates.

The most remarkable achievement of the articles review of agricultural practices adoption determinants relies on that fact that one of the most important factors that was consistent among all the articles, showing a significant positive influence is the farmer organization membership. A FOs membership involves learning platforms and information dissemination such as trainings, knowledge generation, demonstrations and access to technical assistance (Singh et al., 2015; Wollni & Andersson, 2013; Ndonkeu et al., 2015; Haghjou et al., 2014; Tosakana et al., 2010; Ngwira et al., 2014; Mequaninte et al., 2015; Abate et al., 2014). The latter generates at least an increase on average of 5% the production for the same amount of given inputs, a positive impact on the technology adoption (Abate et al., 2014). The case of Ethiopian cooperatives also has proved that belonging to a cooperative society increase the access to governmental and non-governmental extension services, micro-credits and subsidies related to contribute to the technical efficiency of the farm practices (Abate et al., 2014; Francesconi & Ruben, 2012)

In addition, cooperative organizations facilitated the acquisition of environmental certifications among its members which at the same time have spillover effects on non-member farmers in the adoption of improved technology and agricultural practices (Balineau, 2013; COSA, 2012). The Agri-coops membership also increases social capital, amplifies the access to social networks, the collective marketing and compliance of production standards and price incentives (Ngwira et al., 2014). The producer organization membership decreases the probability of practicing inorganic farming and increases the conservation agriculture techniques about 22 %. (Singh et al., 2015; Ngwira et al., 2014; Haghjou et al., 2014; Teklewold et al., 2012). Along these benefits FOs membership improves technical efficiency that contributes to increase yields with the same amount of resources (Abate et al., 2014). Some authors stated that belonging to an Agri-coop affects positively the adoption of SAPs due to collaboration and trust values among members increasing in times of need, as the case of human capital or hired labor sharing

arrangements where farmers worked in sequence from one plot to another to reduce implementation cost (Tosakana et al., 2010; Ngwira et al., 2014).

Also FOs memberships play a crucial role for increasing access of specific inputs for proper agricultural practices and to overcome agriculture practices investing constraints providing credits, loans, revolving funds and others financial mechanism to make liquidity availability to its members (Ngwira et al., 2014). The probability of adopting more than one sustainable agricultural practice increase 11 % when the farmers belong to a farmer organization (Prokopy, 2014; Wollni & Andersson, 2013; Ngwira et al., 2014). Agri-coops membership is also correlated with the fact that farmers trust in local sources of information, therefore, the members find it natural to deal with local problems that are common among his local peers using a cooperative organizations (Long, 2003). Another important conclusion is that the sense of ownership influences the behavior of farmers, especially regarding complying to social norms, values and standards, the persuasion pressure to apply certain practices have a tremendous power for the adoption of agricultural practices inside a producer organization (Prokopy, 2014; Ngwira et al., 2014). Related to the previous point, also Ngwira et al. (2014) found that sharing common goals and interest among cooperative members help to achieve the adoption of collective agricultural practices due to the high reciprocity and altruism practices inside this groups and the interaction between farmers, influencing each other over time through the socialization process. Finally, the last conclusion is based on the fact that being a member of these organizations reduces risk and uncertainty of the implementation of these kinds of technologies (Mequaninte et al., 2015; Ngwira et al., 2014).

2.3.4 SAPs conclusion

Different theories and determinants were presented and analyzed in order to provide a better understanding of the main process and variables affecting the farmer SAPs adoption process. Several variable groups were formed checking previous researches; however, contradictory results were founded in different articles. One of the main conclusions is that there are not common paths, common theories and common determinants that can fit all the possible farmer characteristics, preferences and context combinations for their adoption decisions. Nevertheless, the only consistent factor in all the peer reviews articles was that the FOs and Agri-coops membership always influenced positively in a significant level the adoption of SAPs. Among the most important services found that these organizations provided to its members that contribute to SAPs are:

- Mutual work/labor support schemes.
- Finance (credit/loans/grants)
- Training/demonstrations
- Access to extension, advisory and information services
- Inputs supply
- Negotiate input and output prices
- Grades and standards
- Certifications
- Advocate programs and policies in favor of farmers

The necessity to have a better understanding of these organizations and their service provision is crucial for SAPs adoption. Policy makers, rural developers, environmentalists, national and

local governments in Uganda whose goals are to strength the rates of adoption of SAPs need to look deeply at these kind of organizations and make analysis and diagnosis of FOs and Agri-coops functions and features in order to improve their services provision that can improve the SAPs adoption rates among its members.

2.4 Agricultural activity: goods, services and externalities

2.4.1 The concepts

Agriculture is a multifunctional activity which highly depends on natural resource assets in order to provide flows of goods and services to human beings (Mensah & Camargo, 2004; Schader et al., 2014; Pretty, 2007; Stallman, 2011). These goods or commodities generally involve all the food, fiber and other products that are obtained from farming activity. At the same time, agriculture is related with environmental or ecosystems services that humans can benefit from natural resources such as: flora and fauna biodiversity; carbon sequestration; and land and soil retention (Slabe et al., 2013; Mensah & Camargo, 2004; Schader et al., 2014; Pretty, 2007; Boody et al., 2005; Stallman, 2011). Some of these services are fundamental for human survival like the water cycle, pest control and the weather regulation. These ecosystem services provide human well-being as recreation and landscape spaces (Stallman, 2011). At the same time agriculture activity is interconnected with the society due to it is linked with cultural heritage, traditional customs, spiritual well being and rural lifestyle (Slabe et al., 2013; Pretty, 2007; Boody et al., 2005; Stallman, 2011). In addition, agriculture activity affects the quality and quantity of other services provided by other neighbor ecosystems (Stallman, 2011). Finally, agriculture is also an atypical economic activity due to provide jobs and development especially in rural areas using natural resources modifying them other aspects of environment and landscape for the production activity (Tjitske, 2014). The multi-functional role of agriculture is so important that several countries want to strength the connection between the economic, environmental and social impacts of the agricultural activity and are trying to promote the support of non-market benefits of agriculture through the green boxes payments in the World Trade Organization (WTO) (Boody et al., 2005). This human activity involves so many issues that governing the goods and services related with agriculture is a complex process. The purpose of this section is to define the basic concepts to govern the goods, services and externalities provided by agriculture activity, where SAPs and collective action through Agri-coops and FOs play a fundamental role.

2.4.1.1 Public goods

The first term that is necessary to understand and define is that agriculture activity depends on the public goods in order to maintain itself. These kinds of goods are characterized by non-rivalry aspect which means that all persons can use and benefit from them without take care of their maintenance or creation (Tjitske, 2014; Kollock, 1998). At the same time these types of goods are non-excludable, meaning the impossibility to deny the access or availability of the good to other persons. Some examples of public goods that are associated with agriculture activity are: agricultural landscape, farmland biodiversity, soil functionality, air quality, and water quality and availability (Franks, 2011; Tjitske, 2014). However, is very complicated to find pure public goods which comply fully with the non-rivalry and non-excludable characteristics (Tjitske, 2014; Kollock, 1998).

2.4.1.2 Externalities

The second concept that is important to understand is externalities. The term describes a situation when a production decision from one person or in this case a farmer can affect directly another actor that is not involved neither in the activity nor in the decision making process (Tjitske, 2014). At the same time, the person affected does not receive any compensation from the effects of the activity and decisions took by the other actor (Pretty, 2007). Most of the externalities are a consequence of the multi-functionality of agriculture. Multiple products or services can be produced by the same activity even though not all the services and products were demanded. Therefore, not each production input could be perfectly associated with each production output; in fact, some of the products produced could be non-commodities outputs (Tjitske, 2014). The externalities try to compensate the cause-effect relation between different outputs and their impact to other actors in order to take agriculture production decisions. However, some times is difficult to know the positive or negative effects of each agriculture activity and practices due to the lack of knowledge and information.

2.4.1.3 The market incentives

In the global and liberalized economy practiced on the XXI century, the market is a self-control mechanism to supply goods and services demanded by the society. The supply and demand laws will determinate which products will be produce and under which particular incentive prices, depending on the assets, technology and resources availability. In the particular case of agriculture economic activity the use of natural capital and public goods is every day more intense and focused on short-term benefits (Stallman, 2011; Tjitske, 2014). This production approach creates consequences in the public good and ecosystem services quality and quantity. Since farmers do not have any interest, incentives and motivation to reduce negative externalities or produce positive externalities the quality and quantity of public good and eco-services decrease (Ibidem). Then, private and social cost and benefits differ from each other, thus the social welfare is not reached and it is said that the market failed (Franks, 2011; Stallman, 2011). In order to fix the market failures the production and consumption process needs to be regulated.

2.4.1.4 The Government intervention

When the market mechanism fails to control the availability and quality of public goods and environmental services through the reduction of negative externalities and promotion of positive externalities one of the mechanisms capable to regulate them is the public intervention. The government can internalize the externalities trough policy action with agro-environmental schemes (AES) materialized in taxes in the case of negative externalities and subsidies in the case of positive externalities. The taxes role is to create a penalty or a fine for specific activities or behavior that the government knows that is affecting other activities, goods and services (Tjitske, 2014). Some agriculture negative externalities are: soil degradation, water pollution or greenhouses emissions. One possibility to control these negative externalities is through taxes called “polluter-pays principle” or “polluter-gets principle” (Ibidem). On the contrary, subsidies, in form of premiums or discounts, try to promote those activities and behaviors that reduce negative externalities or promote the adoption of beneficial agriculture practices and measures such as SAPs. Some positive externalities are: soil and water conservation, flora and fauna preservation and protection of the biodiversity and landscape. The intromission of the government to regulate public goods and externalities will depend on the magnitude of the

social welfare affected and if the benefits of doing it prevail over the cost (Ibidem). If the government control measures over externalities failed, the externalities will lead the depletion of the public goods, natural resources and ecosystems services (Stallman, 2011; Tjitske, 2014).

2.4.1.5 The failure of government intervention

Even though government regulation seeks to control the externality problems, the planet is still facing an increase in environmental problems and the government mechanism to rule the agri-goods and eco-services provision is failing. Different researchers have tried to understand the causes of the government mechanism failure and they argued that one of the problems is that AES are targeting specific actions or practices instead of giving priority to the environmental outcomes (Tjitske, 2014). The latter, is related to the fact that the solutions to different environmental problems are site-specific and require adaptive innovation and local solutions instead to comply with a pre-determined list of corrective or preventive actions or practices (Vanni, 2013; Tjitske, 2014). Another important finding is that environmental services require a territorial action plan instead of individual farmer and site-specific practices due to the way that spatial-time scale of ecosystems and biological process works (Stallman, 2011; Tjitske, 2014). The latter requires a holistic management of the environment that is beyond farm borders and which is impossible to manage and deliver in an individual plot scheme. Another issue is that the taxes and subsidies do not cover all the costs incurred by the polluter nor completely subsidize the costs incurred by the farmer who complies with the AES (Stallman, 2011). The latter creates a free-riding problem where some farmers benefit from the measures taken by other farmers without complying or paying for their own activities (Ibidem). In addition, the policies promote AES with high transaction costs due to individual contracts approach. The latter involves higher administrative and bureaucratic costs (Franks, 2011). The transaction cost problem is also faced by each farmer who tries to comply with the regulations and deal with the asymmetry of information problems. Most of the farmers work and live in the country-side and to get timely and correct information on every different scheme that they are interest to comply is a challenge (Ibidem). The transaction cost and asymmetry of information cost generate a low cost-benefit ratio between the money delivered through the AES and the quality and quantity of agri-goods and services provided (Ibidem). Finally, another problem identified is that government regulations do not take into account the use of bottom-up mechanisms which through the use of collective action and cooperation can join farmers, individuals and other organizations from a specific geographic area, who have the same interest, motivations and who can reduce transaction cost, asymmetry of information, monitoring and inefficiency of agri-goods and eco-services delivery provision (Stallman, 2011; Tjitske, 2014). Without a doubt, the regulation of agricultural production and maintenance of public goods and environmental services is extremely important for the development of the society; however, the constant overexploitation of the natural resources and unsustainable agricultural practices require the implementation of new mechanisms that provide better management in the rural areas (Feres, 2005).

2.4.2 Collective action: The complementary path

In order to face the top-down intervention failure in governing the agri-goods and eco-services, different scholars have focused on complementary solutions using collective action theory. According to the Organization for Economic Co-operation and Development (OECD), collective action is a concept that refers to “...a set of actions taken by a group of farmers, often

in conjunction with other people and organizations, acting together in order to tackle local agri-environmental issues” (OECD, 2013, p.58). Collective action is mainly integrated by three different actors such as: groups of farmers that implement the solutions; groups of non-farmers, who provide the knowledge and expertise to implement collective action solutions; and the government, which participates with its support to create the conditions for collective action to take place (Stallman, 2011; Tjitske, 2014). The groups of farmers can be identified with terms as: farmer associations, community based organizations, Agri-coops, FOs and names of other customary self-help organizations (Prager, 2015). In addition, there are two types of collective action, the cooperation type, which is a bottom-up strategy led by farmers; and the coordination type which is a top-down strategy led by an agency or in most of the cases the government (Prager, 2015; Tjitske, 2014). The reasons behind the use of bottom-up mechanisms are related to the fact that agri-goods and environmental services deal with non-rivalry goods which are better preserved and produced collectively through groups of farmers that face similar problems and are willing to work together (Prager, 2015; Tjitske, 2014; Stallman, 2011). Therefore, most of the time the AES are better applied by the collaboration of farmers from the same geographical area and with similar natural resources conditions rather than individual farmers (Stallman, 2011; Prager, 2015). The bottom-up approach is complement of the top-down approach due to the farmers’ voice and organization is the starting point to find solutions to solve the public goods degradation problem (Tjitske, 2014; Stallman, 2011).

2.4.2.1 The benefits of the collective action

Different advantages have been analyzed of the bottom-up mechanism for the provision and preservation of agri-environmental goods. The first one is related to the reduction of transaction cost from both, farmers groups and the government. Collective action through collective AES contracts reduces the number of single farmer’s contract, reducing the bureaucracy, administrative, screening and monitoring costs of individual contracts (Stallman, 2011; Franks, 2011; Prager, 2015; Tjitske, 2014). The cost reduction increases the participation rates among the farmers involving a wider scope of persons with knowledge and skills diversity (OECD, 2013). Indirectly, collective contracts improve the allocation efficiency of public funds and incentives (Tjitske, 2014; Prager, 2015; Franks, 2011). This efficiency improvement is based on the stronger collaboration between farmers groups, experts and governments which increases the trust among them and decreases asymmetry of information problems due to the identification of reliable sources of information and the use of them in a proper time (Stallman, 2011; Tjitske, 2014).

Secondly, collective action is a result oriented mechanism that improves both financial and technical efficiency to reach specific environmental outcomes through a larger geographical and time scales approach, rather than focus on specific single farm and short-term practices (Franks, 2011; Stallman, 2011; Tjitske, 2014). In addition, the knowledge and technical information sharing is more efficient due to the internal organization of the groups. The self-help organizations of farmers groups increase the efficiency of the local strategies to reach the AES objectives among the farmers complying with the governmental legal framework (Franks, 2011). These strategies are based on the knowledge of the specific local conditions, past experiences and the decision making of the members to identify the main problems and allocate the resources in faster implementation rates than central authorities and top-down approaches (Stallman, 2011; Prager, 2015).

Finally, collective action increases the social capital of the farmer's groups through face to face communication which increases the advice, mutual support, collaboration, trust, commitment and the willingness to comply with the rules and regulations; generating a sense of belonging to a social group and an esteem their individual contributions are considerable valuable (Prager, 2015; Stallman, 2011). Besides the peer-pressure mechanism inside the farmer group change the attitudes, values and aspirations of farmers which at the same time increases the rates of adoption and harmonization of environmental and agriculture measures and practices (Tjitske, 2014; Prager, 2015).

In the long-term the implementation of collective action AES benefits individual farmers with better production yields in their plots reaching the optimal cost-benefit solution (Tjitske, 2014). In policy terms the collective action also opens the range of different types of instruments and options for central authorities to create new schemes and ways to solve public goods degradation problems also called the "tragedy of the commons" or "tragedy of the eco-systems services" (Stallman, 2011). The reduction of public expenditure also helps the government to use the money saved to intervene in missing environmental markets which will improve the environmental situation of public goods (Stallman, 2011; Vanni, 2013).

2.4.2.2 Pre-requisites for collective action

In order to obtain the best results with collective action it is necessary to identify some requirements of the agri-goods and eco-services that need to be fulfilled. First of all, it is necessary that centralize authorities are willing to decentralize their power and their decision making process and share it with people through local farmer groups or farmers associations (Tjitske, 2014; Prager, 2015). This action will also require initial investments to shift and expand the scope of AES available to use collective action to govern the agri-goods (Stallman, 2011). The latter involves the making of social welfare cost-benefit analyses in order to decide if the changes in decentralization policies will lead to a better distribution and increase of the public and private welfare (Tjitske, 2014). The contracts or agreements between the central authorities with the local groups have to be efficient, effective and enforceable allowing the collaboration and coordination at different levels (Prager, 2015). Also it is necessary to look at the ground level and understand if the neighboring farmers inside in a specific territory are willing to work together and form a stable organization maintaining trust and a low level of conflicts. In order to do the latter, members have to be socially diverse but share similar goals, beliefs, motivation and interest (Stallman, 2011).

Thirdly, it is very important to identify and characterize the correct type of agri-goods and services that each territory and farmer group has to deal with. According to Stallman (2011), there are some characteristics that make public goods and eco-services suitable for the collective action. The first one is the potential of the agri-good and eco-services to improve and enhance the quality and quantity of the good. The second one is the potential agri-good and service to create private benefits for individual farmers who are working for its provision. At the same time, the provision of these goods and services needs to have the indirect potential to create a positive interest of free riders farmers to collaborate with the collective action group and be part of the collective solution. The fourth characteristic is the potential of the agri-good and services chosen to benefit indirectly other neighbor public goods and ecosystems. Finally, it is important

to check the amount of natural resources, the size of the territory and the number of participants that are necessary to get involved in order to reach the goals of the specific AES. If the provision of the agri-environmental good or service requires a big number of farmers in a huge territory, the heterogeneity of goals and interest will increase, reducing the social capital among the group and increasing transaction costs, reducing the net benefits of the agro-environmental goal (Tjitske, 2014; Stallman, 2011).

2.4.2.3 The challenges of collective action

After the experience of different projects and communities which worked from several years dealing with the governing of natural resources, public goods and environmental services; a lot of challenges have to be solved. The first one is to strengthen the internal farmers' groups' mechanism to reduce the cost related to contracting, execution, monitoring, evaluating, sanctioning and payments of the implementation of collective AES (Tjitske, 2014; Franks, 2011). The second challenge is the lack of professionalism in the farmers groups to comply with the central authorities' structures, requirements and administrative process to facilitate the implementation and the information flows among the local, regional, state and national levels (Tjitske, 2014). Another challenge is to understand that the AES execution and financing have a long-term duration in order to reach its benefits. This requires a lot of long-term compromise from all the actors involved, which in most of the cases they are not willing to accept (Ibidem). According to Franks (2011) other challenge is related to the identification of three individual farmer profiles that can affect the level of efficiency of the collective action among the groups. The first one is the farmer who already is taking some actions and measures to preserve and provide a specific agri-good or service without any economic interest and who now is necessary to compensate, increasing the cost of the AES. The second farmer profile is the one that is not willing to collaborate because it is not his/her interests or because they do not consider themselves able to provide the agri-goods or services. The last farmer profile is the free-rider who understands that they can avoid participating in the AES measures but still benefit from them. In addition, there is always the challenge to change the farmer perception that making collaboration with other farmers and the governments will decrease their individual decision making power (Prager, 2015; Franks, 2011). Finally, collective action is also related to the difficulty to find people with certain leadership characteristics, experience and reputation to get the support of regional farmers and the government to lead the AES (Franks, 2011).

2.4.2.4 The role of the government on collective action

With the government's decision to decentralize the control of AES to farmer groups, some of their functions as the administrative, monitoring process will be reduced; however, new functions are necessary to perform (Franks, 2011; Tjitske, 2014). One of these new governmental functions is to intervene when the market fails, only if the cost-benefit analysis to do it shows positive results in the welfare relation (Tjitske, 2014). In addition, the government needs to provide support to farmer groups providing expertise in different areas which help them to change values, attitudes and perceptions which in the long term will improve the diffusion of innovations and the implementation process (Franks, 2011). Also the government's role is to increase the participation rates among the farmers solving the hold-up, assurance and incomplete contracts problems (Prager, 2015; Franks, 2011). The hold-up problem refers when the members of a farmer group receive less profits from their individual agri-goods and services provision due to the contracts benefits have to be distributed among an increasing number of

members (Prager, 2015; Franks, 2011). The assurance problem refers to ensuring compliance regarding the requisite number of farmers to apply certain measures to ensure the provision of the public-good or service and reach the AES goal through a collective action solution (Prager, 2015; Franks, 2011). The incomplete contract problem requires that the government builds trust among farmers groups to amend the contracts in order to fill the gaps of the AES (Ibidem). Finally, government will need to create the conditions and institutional environment through policies for the collective action take place, induce cooperation among the farmers and in this way improve the agri-goods and eco-service provision (Tjitske, 2014).

2.4.3 Conclusion: Agri-goods and services, SAPs and collective action

The multi-functional characteristic of the agricultural activity and its relation with public goods require control mechanism that ensures the conservation and preservation of public goods and environmental services for the benefit of human wellbeing (Tjitske, 2014). The government has the responsibility to intervene when the market fail. The government role is to create the policies and AES to ensure the quality and quantity of the agri-goods and eco-services provided (Vanni, 2013). However, the nature of the agri-goods and eco-services involve a broad geographical and time space scale for their implementation, resulting that the government individual contract approach fails to govern them (Tjitske, 2014; Vanni, 2013). When the government fails to provide the necessary public goods and eco-services due to transaction cost and the nature of the environmental measures, collective action through farmers groups seems to help increasing the efficiency of their provision (Prager, 2015; Franks, 2011; Stallman, 2011; Tjitske, 2014). These groups of people can be represented by: FOS, Agri-coops or other customary self-help organizations (Prager, 2015). As well as the market and government, the collective action approach involves an analysis of costs and benefits in order to determine the most efficient solution for agri-goods and services provision. Collective action reduces transaction and management costs, increases the efficiency of the implementation and the collaboration among local farmers (Stallman, 2011; Franks, 2011; Tjitske, 2014; Prager, 2015). Collective action also solves the problem of geographical and time scales embed in the agri-goods and eco-services provision (Tjitske, 2014). SAPs are part of the AES and require that collective action through FOs and Agri-coops take place (Prager, 2015). However, the collective action cannot be implemented alone, a combination of government intervention and the market is necessary in order to address the under provision of agri-goods and environmental services (Tjitske, 2014; Stallman, 2011; Nkonya et al., 2002; Franks, 2011; Prager, 2015; Vanni, 2013).

2.5 Uganda context

2.5.1 Uganda: The pearl degraded

The republic of Uganda is located in East-Africa and embraces more than 34 million inhabitants. Once known as the pearl of Africa, Uganda is one of the most diverse and richest natural resource base countries (Musimami, 2012). According to the national development plan of the International Monetary Fund (IMF) (IMF, 2005), Ugandan livelihoods largely depend on agri-goods and services production because national government plans use the country's environmental and natural resources endowments in order to reach economic and social development. The World Development Report made by the World Bank (2006) suggested that agricultural growth has a much more impact on hunger than general economic growth does and also is two to four times more effective than the non-agricultural sector in increasing the bottom

third of the income distribution. In this context, agricultural activity is one of the most important vehicles to reduce inequality, poverty and achieve sustainable development of the country.

Uganda's agriculture numbers show the dependence on this activity in its entire society. This economic sector is the largest employer accounting for around 75% of the total labor force, 80% of the employed household population, sharing 50% of total exports and 26% of the GDP (Akullo et al., 2007; World Bank, 2011; Sanginga et al., 2007 and FAO, 2013). In addition, the country has three million smallholder farm households where 80 % of them possess less than 4 hectares of land (FAO, 2013; World Bank, 2011). Around 21% of Uganda's territory is cultivated and about 70% of its agricultural production is for subsistence purposes where over 60% of the crops are produced mainly for food (FAO, 2013) producing: plantains, cassava, sweet potato and maize; where the major cash crops produced in the country are: coffee (Arabica and Robusta varieties), tea, tobacco, and cotton (Amanigaruha & Manyindo, 2010). The most important smallholder farmers' livelihood is intercropping coffee with food crops. 80% of the population lives in rural areas and their livelihoods depend on agriculture, and 40% of all rural people live below the poverty line (Musimami, 2012; FAO, 2013). The necessity to generate better economic environment for Uganda's agriculture is crucial in order to maintain agricultural growth in rates that contribute significantly standards of living of its population.

Besides economic concerns, Uganda's agriculture is facing different challenges that are putting at risk its productivity creating significant social and environmental threats. The high population growth, with a rate of 3.2% annually, continues generating pressure, especially in the massive land use changes that are happening without proper and efficient land use and natural resource management plans (World Bank, 2011; FAO, 2013). With this rate of growth, the population is expected to increase from 35 million in 2013 to 95 millions in 2050 (Amatheon, 2015). Nowadays, the land endowment per capita is three times smaller than the world average. This situation set Uganda as one of the lowest land availability rates in the world (World Bank, 2011). At the same time, this growing population leads to an increasing demand for food at lower prices putting tremendous pressure on the agricultural activity, increasing deforestation, wetland degradation, bush burning, overgrazing and over cultivation (Cesar & Wolf, 2013; FAO, 2013; MTIC, 2011). From 1971 to 2005 Uganda registered a loss of 76% of their total forest cover and continues with a rate of 2.2% annually (MTIC, 2011). The policy implementation fails to prevent these problems at both a national at local levels (Ehui & Pender, 2003). These conditions are generating a main problem in the natural resources and in the agricultural activity of the country: land and water degradation.

During the last years Uganda's land degradation has been identified as the crucial impediment to achieving agricultural sector potential. Land is the essential asset of most of the livelihoods and the national economy and is the main contributor of the annual cost of environmental damages (Amanigaruha & Manyindo, 2010). Around 46% of Uganda's land and soil is degraded (FAO, 2013). The poor management of their soil with improper nutrient management and the lack of capital and labor to invest in sustainable soil management creates soil fertility losses, resulting in low yields and low quality of the production. At the same time, the lack of conservation practices such as: mulching, fallow, soil retention structures and organic fertilizers increase soil erosion, landslides and agrochemical pollution decreasing soil productivity, reducing the income among the farmers and increasing food prices (Saito, 2007). Uganda loses

around 17% of its GDP annually as a consequence of soil degradation and 11% of the losses came from soil erosion (FAO, 2013; Amanigaruhaniga & Manyindo, 2010). The necessity to implement measures that promote and adopt sustainable agricultural practices among farmers has to be a national priority in the country to achieve sustainable development (Asafu-Adjaye, 2008).

Uganda has a significant surface and groundwater endowment; however, the water degradation is affecting the quality and quantity of water bodies. The water sources and wetland degradation contributes to the drop of the water level of Lake Victoria (MTIC, 2011). Water degradation is the result of three fundamental factors: population growth, the lack of watershed management planning and the effects of climate change and global warming (Saito, 2007; Teklewold et al., 2012). The population growth leads to improve the watershed management, environmental sanitation and better solid and liquid waste management. The inefficient implementation of policies that promote a basin plan for conservation practices such as: terraces, retention ditches, drip irrigation systems, check dams and channels; that can reduce the soil erosion and decrease the water consumption in agriculture is one of the reasons for the diminished water quality and quantity in Uganda (FAO, 2013). On the other hand, the lack of an adaptation plan against climate change is means that weather conditions that reduces the quantity of surface and groundwater are not properly dealt by the government at the national level, neither by society at the local level. It is considered that only 6% of land in sub Saharan Africa has appropriate climate conditions for agriculture potential (Ehui & Pender, 2003; GOU, 2012) . The degradation of water and soil resources together with climate change is having a tremendous impact in Uganda and the livelihoods of millions of households. In this context better agricultural practices can move out the resource degradation poverty trap (Wollni & Andersson, 2013).

Despite the important efforts of Uganda government to work on a sustainable resource management strategy, the conditions are not improving. After 1986, the national resistance movement, Uganda became one of the most important promoters of decentralization in Africa and several policies and organizations were put in place, creating a framework of environmental control, management and conservation legislations (GOU, 1997; Saito, 2007). During that time, the government started to collaborate with international organizations, (NGOs) and community based organizations, resulting in the creation of different collective action initiatives such as: protected areas that created and took care of national protected parks, around 13% of the national area; collaborative management, for the extraction of resources integrating communitarian monitoring and decision making process; and community based organizations that gave control to the communities for the management of their natural resources, implementation of conservation practices (Saito, 2007; FAO, 2013). In 1997, the governments created the Plan of Modernization of Agriculture (PMA), using the agriculture sector to alleviate the rural poverty, focused on sustainable food production, improving agricultural practices, the efficient use of land and water and promoting high-value commodities moving from subsistence farming to commercial farming (GOU, 1997; GOU, 2012). To implement it, the government focused on strengthen the research system of the country, improving the quality of the extension services, promoting the sustainable use and management of natural resources especially soil and water, rehabilitating rural infrastructure, improving access to markets, strengthening producer organizations and setting the proper standards of production and quality control (Saito, 2007).

However, all these efforts were insufficient, especially because of inadequate investments and the high dependency of natural resources and their extraction in particular by the poor sector of the population (FAO, 2013). The insufficient implementation of sustainable environmental policies is destroying the foundation upon which the country development is based on (Amanigaruhanga & Manyindo, 2010). One of the important challenges for many rural developers is to find ways to reverse the lack of interest and increase the adoption rates of sustainable practices especially in agriculture.

The causes of the failure in the policy implementation to reduce soil and water resources degradation have many angles to analyze; however, some of them have implications for this research. First of all, even though that the policies are set by the government, there is insufficient as regard the rules, there is a lack of participation among the beneficiaries, communities and farmers in the process of planning, designing, adopting and monitoring the management of their natural resources (World Bank, 2006; Saito, 2007). Secondly, there is not a proper inclusion mechanism. The government is the only actor who takes decision on the management and use of the natural resources. In the best of the cases, just a few elite farmers have power in the decision making and control of the resources (Ibidem). Thirdly, there is not a proper integration between farmers' agricultural practices and formal research institutes to improve the conditions of the agricultural production process. Besides, the extension services are insufficient to provide quality and quantity of technical assistance, information and knowledge to the beneficiaries (FAO, 2013). Fourth, there is still much to do to link the external support that farmers and communities can receive from NGOs, international organizations and the coordination among them (Sanginga et al., 2007). Fifth, when the management of soil and water involves the management of an entire territory as a watershed it is fundamental to use collective action mechanism; the individual profitability of these sustainable practices is null working at a farm level alone (Saito, 2007). The management of natural resources requires high labor costs and there is a deficit of capital and credit to invest in rural areas (FAO, 2013). Finally, in a country where the land availability rates per capita is one of the lowest in the world, a communitarian approach is necessary and the social capital is fundamental to solve the community problems.

In conclusion, the effects of environmental degradation in the country is contributing also to the increment of droughts, floods and landslides which affect directly the Agri-coops and FOs activities and the Uganda's economy (MTIC, 2011). The county has in its hands the solution to create environmental conditions that can improve the national sustainable development. Unless the vicious cycle that increases poverty, declining agricultural productivity and increasing resource degradation is reversed; Uganda will continue struggling with inequality, resource exploitation and food insecurity (FAO, 2013; Saito, 2007; Ehui & Pender, 2003). The necessity to solve the farmer adoption problems of SAPs is fundamental. The self-help organizations are an alternative tool to stop this vicious cycle. Meanwhile, the pearl of Africa will remain degraded.

2.5.2 African cooperatives: history and situation

Farmer organizations have a long human history, since ancient times the traditional communities in different regions understood the importance and benefits of forming groups and acting collectively in agricultural activities. This understanding creates a shift from nomadic to

sedentary societies (Ahmed, 2014). In developing countries, cooperatives have passed through different challenging moments since their formation and a lot of concerns related to the improvement of their health and efficiency remain unknown (Ostrom, 2004). In Africa the life expectancy of cooperative societies is on average around 7 years (Francesconi, 2016). The African countries went through a similar cooperation history that set them into their actual conditions (Schwettmann, 2015). Before 1910, African self-help organizations faced a pre-colonial stage, where the collective outputs were community led. During this stage, the main goals were the members' mutual support and to ensure the production of food according to the community necessities (Schwettmann, 2015; Francesconi, 2016). Between 1910-1960 a second cooperative era started with the colonialism period (except in Ethiopia, South Africa and Namibia), which was basically characterized by adaptation to foreign models and state and church paternalistic intervention (Schwettmann, 2015). The third period started in the early 1960's after the independence where the cooperatives were used to promote African socialism. This period was characterized by cooperativization; market and supply monopolies; and state support, control and interference (Ibidem). In 1985, after the Washington consensus and the collapse of several state-sponsored cooperatives, governments started the market liberalization policies which led to the competition of cooperative societies in the globalized market (Schwettmann, 2015; Francesconi, 2016). The African cooperatives were not prepared for such a change and required donors and external funds to survive. According to Schwettmann (2015) this cooperative situation generated triple crises which affect the identity, the environment and effectiveness of the cooperative movement in Africa. The identity crisis was generated by the creation of cooperatives by name, not by nature (Ibidem). The environment crisis was an effect of the institutional context with which the cooperatives had to deal (Ibidem). This crisis was characterized by the lack of legal and administrative support to the genuine cooperative enterprises. The effectiveness crisis generated cooperatives incapable to survive without external aid (Ibidem). By the mid 1990's, different governments and national and international organizations started to look at the new cooperative enterprise models as a solution to reach self-sufficient governance and sustainable cooperative societies (Francesconi, 2016). New reforms were established reducing the state intervention and decreasing the amount of subsidies and cooperative monopolies (Schwettmann, 2015).

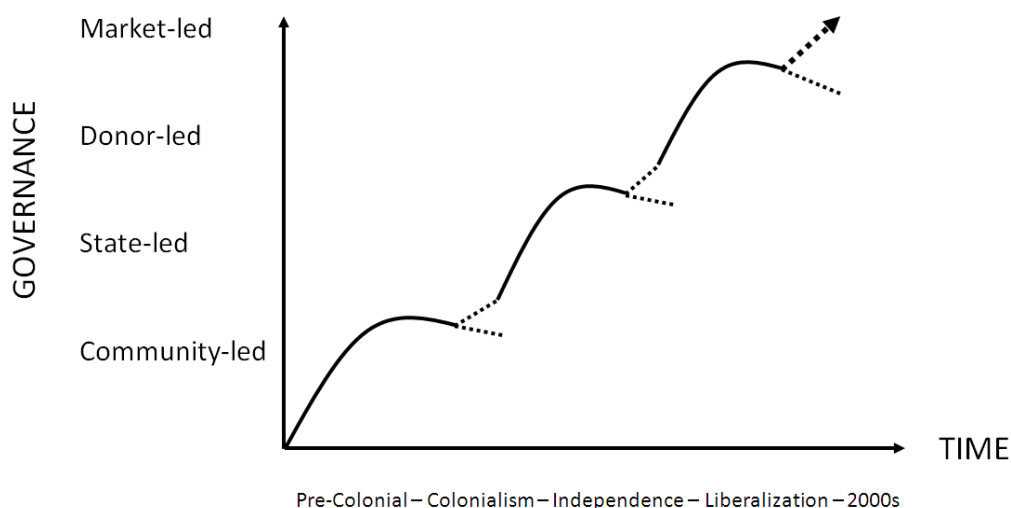


Figure 5. A general history of rural cooperation in Africa.

Source: CLE, 2016.

Among the main adoptions that New African generation of cooperatives are implementing are: to move from a mutual support to a collective marketing and value addition cooperative; a shift from diversify production to a specialized production; a membership inclusion, a transition from kinship to motivated and capable individuals; a transition from aid dependency to capital acquisition, a shift in the decision making structure from single farm extension cooperative to a complex firm organization structure; a claim rights transition from mutual's to shareholding (Francesconi, 2016). Despite these efforts, different authors argued that African cooperatives performance varies and most of them are still struggling to provide collective marketing and other services due to weak market integration, lack of leadership, diversity on member preferences, weak and narrow scope of bylaws, side-selling, and elite capture issues (Wanyama, 2014; Francesconi et al., 2015; Kwapong, 2013). Additionally, cooperative members faced low bargaining power and low yields due to climate change effects and environmental degradation (Rodrigo, 2013; Mojo, 2015; Stellmacher & Grote, 2011).

2.5.3 Ugandan cooperatives

Since their legal creation in 1913, the modern Uganda cooperative movement have been struggling with similar changes in order to become a successful organization model (MTIC, 2012). The last important change was made in the 1990's, after market liberalization policies, when the Ugandan cooperative sector collapsed and was forced to shift from inefficient state formed cooperatives to autonomous business-oriented cooperatives (Kwapong, 2013). Among the challenges that Ugandan cooperatives face today are the lack of external support; mismanagement; inability to compete in liberalized markets; debt accumulation; political interference; inappropriate market system; lack of services provision; low productivity; side selling; elite capture; and natural capital pressure (MTIC, 2012; Kwapong, 2013).

Despite the enormous challenges that they have faced, cooperatives are still long standing and widespread in Uganda and are facing an important revitalization time. With the creation of the second Ugandan National Development Plan 2015-2020 (NDPII) the government in Uganda is trying to maximize the benefits of the revitalized cooperative movement improving the institutional environment for the cooperative societies (GOU, 2015). The government aims to reorganize Uganda communities into cooperative groups in order to increase citizen participation, reactivate the economy, increase population income, modernize the agricultural sector and ensure sustainable development as well the environment and natural resources (Ibidem). Despite to having the National Cooperative Act written in 1991 and a the Cooperative Society regulation written in 1992, the Ministry of Trade, Industry and Cooperatives of Uganda (MTIC) is making efforts to formulate, review and support policies and plans to ensure the expansion and diversification of cooperatives, in order to increase the value of their national exportations from 12.9% of its GDP in 2012 to 16.5% by 2020 (Ibidem).

By 2015 MTIC has registered more than 15,200 cooperatives with a membership of more than 4 million people (GOU, 2015; MTIC, 2011). These cooperatives are involved in different economic activities where agricultural production and marketing represents 55%; saving and credit 23%; multipurpose 6%; and services 16% (MTIC, 2011). Nowadays, the Ugandan cooperatives start to get involved in innovation sectors like: energy distribution, housing and transportation (GOU, 2015). Besides, the country has about a 121 secondary cooperatives unions including more than 80 area cooperative enterprises (ACE's) which are involved in the

processing and value addition of fruits, vegetables, honey, coffee and cotton commodities. The country also has 4 tertiary cooperatives and one apex (MTIC, 2011). In addition, the country has registered more than 6,300 SACCOs which provides, saving accounts and loans to their members (GOU, 2015). Despite the positive numbers, the government recognizes the weaknesses that are affecting the cooperative society's growth. According to the NDPII (GOU, 2015) the main challenges to solve are: weak legal and regulatory framework; scarce human capital (governance and leadership gaps); lack of shortage facilities; weak information communication technologies; and a low saving culture among the population. In order to face that weakness the MTIC, is intervening in the cooperative sector in five aspects. The main goals are:

1. Popularize, disseminate and implement the national cooperative development policy
2. Strengthen governance of the cooperative movement
3. Strengthen the cooperative commodity marketing infrastructure
4. Revitalize the Uganda commodity exchange
5. Improve access to financial services

2.5.4 The Uganda cooperative policy and natural resources

According to the Uganda national cooperative policy, its main objective is “...to develop and strengthen the co-operative movement in order to play a leading role in poverty eradication, employment creation and the socio-economic transformation of the country.” (MTIC, 2011, p.3). In order to do so, one of its specific goals is “...to address the crosscutting issues of gender mainstreaming and fair representation of marginalized groups, sustainable natural resource use and, HIV/AIDS and Malaria.” (MTIC, 2011, p.3). This policy strategy is aware that natural resources in Uganda play an important role leading the diversification of production of the cooperative societies. This policy also recognizes that environmental degradation impacts negatively the cooperative production activities. Aware of this situation, the Ugandan government identified three actions that can help the cooperative performance in this regard. The first one is to create awareness campaigns on environmentally friendly practices among cooperatives societies; the second is to incorporate environmental concerns in the regulation of cooperative business; thirdly the cooperative policy seeks to promote the development and compliance of environmental production standards and certifications (Ibidem).

Under this national context, agriculture cooperatives and self-help organizations play an important role in social, economic and environmental terms and improving their health is crucial for the sustainable development of the country. In order to understand the role of Agri-coops and FOs in the adoption of SAPs it is necessary to stop looking at them as black boxes and try to understand the underlying problems that remain unknown, to look not only at the production and marketing information but also to look inside them and understand the complexity of their functions and features. (Ostrom, 2004; Cook & Chaddad, 2000; Borzaga & Galera, 2014).

2.6 Wrapping up

In recent years, the sustainable development concept has been useful to create a framework in which the human civilization based its goals. The framework defines three components that have to be integrated in order to maintain human existence. The social component is concern of the well-being of the individuals and its society; the environmental component concern with the protection of environment and nature; and the economic component concern with the creation of wealth through the production and management of goods and services. Agriculture

activity plays one of the most important roles maintaining human civilization through the provision of agri-goods, environmental services and its positive externalities. This activity based its goods and services provision to human beings in two fundamental resources: soil and water. Without enough quality and quantity of any of those assets, agriculture activity cannot be sustained. SAPs are technologies created to guarantee the conservation of these two invaluable resources in order to ensure agricultural activity. However, the conventional mechanisms created that try to promote the implementation of the SAPs among farmers frequently failed. The market mechanisms fail due to its lack of economic incentives to farmers to implement SAPs. By the other hand, the government mechanism fails due to its narrow approach to create contracts that seek SAPs implementation in an individual farmer approach, without considerate that most of these practices have to be implemented collectively. Despite these two failures, the collective action mechanism trough the creation of FOs and Agri-coops seems to complement the market and government mechanisms, providing to their farmer members enough economic incentives to implement SAPs in a collective approach. Therefore, it is fundamental to understand which functions and features of these organizations help for the SAPs implementation of its members.

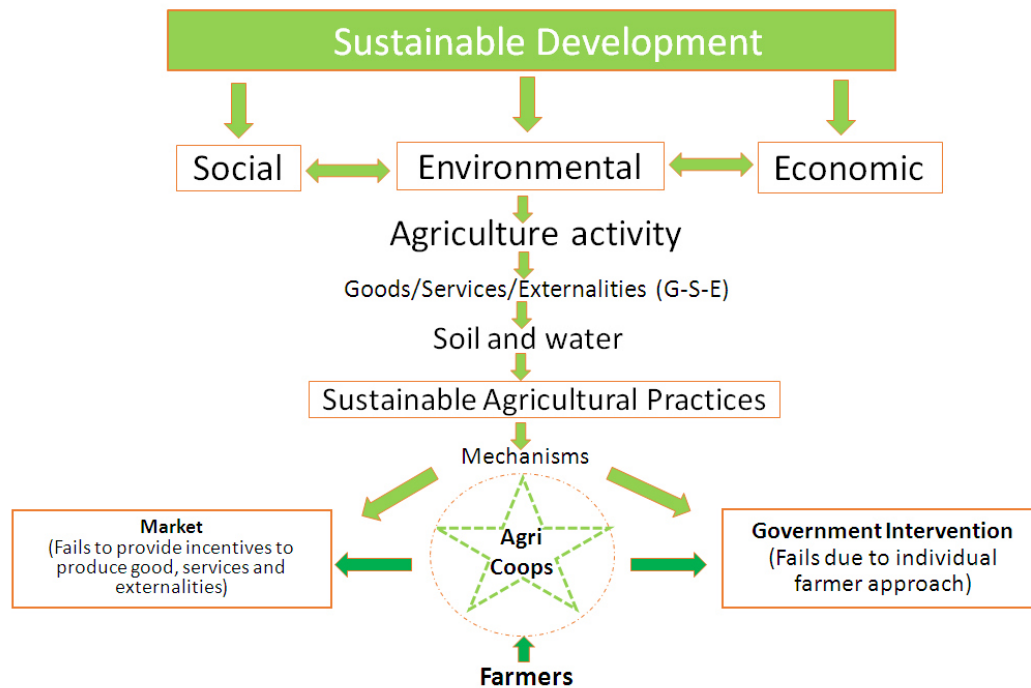


Figure 6. The role of Agri-coops and FOs on SAPs adoption.

Source: Author's compilation from literature review.

Chapter III Conceptual and theoretical framework

3.1 Conceptual framework

A conceptual framework is an analytical tool that is used to help in the awareness and understanding of interrelated ideas which form a specific and abstract representation of one aspect of reality (Kombo & Tromp, 2014). It also assists a scientific research to make meaning of the findings obtained it helps to balance the needs to be reached and to capture the real life complexity (Bandini, 2013). One of the most important frameworks elaborated to analyze and elaborate strategies for the sustainable management of natural resources of farmers and marginalized groups is the Sustainable Livelihoods Framework (SLF) (Bennett, 2010; Ferguson, 2012; Kumar et al., 2015). The SLF was developed by Robert Chambers and elaborated by the Department for International Development (DFID) and it is used for planning, monitoring and evaluating development projects and research (DFID, 1999).

The framework embraces all the main aspects that interact in a rural livelihoods context. According to Ashley & Carney, a livelihood “...comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.” (Ashley & Carney, 1999, p.45). Under this framework agriculture cooperatives can be seen as another livelihood option for the provision of basic community services and needs whose main role is to improve income generation, well being, food security and sustainable use of natural resources in rural communities (Ferguson, 2012; Kumar et al., 2015).

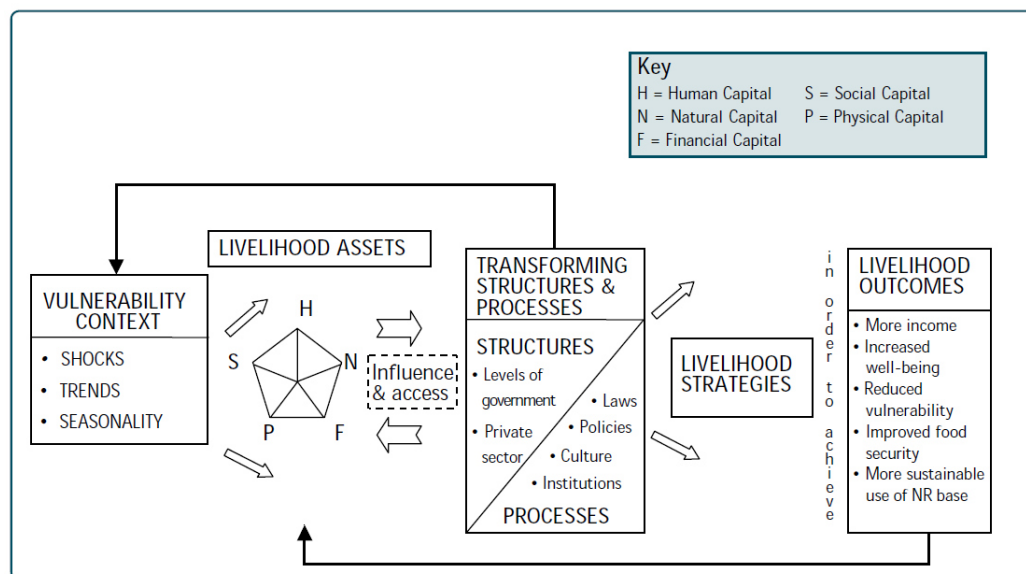


Figure 7. Sustainable livelihoods framework.

Source: DFID, 1999.

The SLF sets individuals or groups at the center of their own development and determines the elements that influence rural livelihoods (DFID, 1999). There are five elements that are integral the sustainable livelihood framework: the livelihoods assets, vulnerability context, transforming structures and process, livelihoods strategies and livelihoods outcomes (Ibidem). The first element the “livelihoods assets” represents the strengths of the people. The SLF identifies five different types of assets such as: human capital, social capital, natural capital, physical capital and financial capital. These strengths are considered necessary to influence and access the transforming structures and process (GLOPP, 2008). A brief description of each asset and its relation with cooperatives is presented.

Human Capital: Agri-coops and FOs act as a knowledge platform to develop the awareness, perception, attitude and technical information of its members regarding specific topics (Ferguson, 2012). These organizations also empower its members/owners through democratic decision making and leadership skills. These organizations also provide good and services to its customers and members to improve their well-being (Kumar et al., 2015).

Social Capital: Agri-coops and FOs are groups of people who aim to work together and reach a common goal. The collective nature of these organizations needs human relationships based on trust, reciprocity and collaboration (Ferguson, 2012). This community building characteristic also gives to its members the power to influence the collective voice which access to external support, power structures, actors and process to advocate specific community needs (Kumar et al., 2015). In order to achieve the latter, cooperative societies need to be inclusive and create internal rules to comply among its members.

Natural Capital: Agri-coops and FOs cannot create natural resources but they can facilitate an equitable access among their members (Bennett, 2010). These social groups depend on the sustainable management of the natural capital in order to run a viable and durable livelihood strategy (Ferguson, 2012).

Physical Capital: One of the main characteristics of these organizations is the shared ownership of the infrastructure that is used for logistic purposes, income generation and to provide community necessities (Kumar et al., 2015). The physical capital could include storages, processing facilities, vehicles, equipment and offices (Ibidem).

Financial Capital: Agri-coops and FOs are social mechanism that requires and generates economic wealth (Ferguson, 2012). One of the main purposes of these organizations is to strengthen their collective bargaining power in order to obtain better inputs and output prices. Also provide credit, loans and savings services among their members (Kumar et al., 2015). It is also important to highlight that Agri-coops and FOs also contribute to the employment creation in their communities.

The second element of the sustainable livelihood framework is the “vulnerability context”, which represents the external environment where people interact, which is out of control of the people’s influence (DFID, 1999). The vulnerability context involves shocks, trends and

seasonality. The shocks are seen as all the circumstances that create livelihoods risks and restrict the people's assets (GLOPP, 2008). These shocks involve natural disasters, economic crisis, social conflicts and others. The trends concept refers to social movements, technology trends, market trends, etc. Finally, the seasonality term involves the variability on prices, production process and labor. It is important to understand that under this framework not all the trends and seasonality involve negative livelihoods effects (Ibidem).

The third framework element is the “transforming structures and process” which are all the public and private actors and social mechanism as laws, culture and institutes that people have to deal with and in some cases influence in order to obtain a specific livelihood strategy (DFID, 1999). The transforming structures and process also try to decrease the vulnerability context and enhance the livelihood assets of the people (GLOPP, 2008). The fourth element is the “livelihoods strategies” which depend on the availability of livelihoods assets, the currently vulnerability context and the influence over the transforming structures and process (DFID, 1999). These strategies are conscious and coherently structured actions and options that people chose in order to achieve their livelihood outcome in the future (Niehof, 2004). Finally, the last element called the “livelihood outcomes” will be the final results of the interactions among all the previous livelihood elements. These results are associated with income generation, well being improvement, food security and sustainable use of natural resources (Niehof, 2004; Kumar et al., 2015; GLOPP, 2008). The outcomes reached will set the new conditions of vulnerability context and livelihoods assets on which the people will be depend on to improve or create a new sustainable livelihood strategy.

The SLF is a model which shows that Agri-coops and FOs act not only as a group livelihood that generates wealth and strengths other assets but also as external transformative structures for people's livelihoods. In the context of this master thesis, Ugandan Agri-coops and FOs are set in the centre of the sustainable livelihood framework in order to understand their role and internal characteristics which influence the sustainable management of natural resources. This research specially focuses on the internal Agri-coops and FOs assets, features, structures, processes and strategies to achieve the SAPs adoption among its members.

3.2 Theoretical approach

A theoretical approach is an association of interrelated ideas, propositions and assumptions based on different theories sustained by evidence or data collected (Kombo & Tromp, 2014). The theoretical approach assists the scientific research to understand a specific problem or situation in a wider perspective (Ibidem). The main purpose of this section is to define the main characteristics and features of successful Agri-coops and FOs that can facilitate the SAPs adoption among its members. In order to define the main characteristics of these organizations it is necessary to look at the internal variables that define successful organizations not only as social groups but also as business organizations. The variables which have positive effects on a cooperative social group were selected from the collective action theory. The variables which have a positive effect on cooperatives as business organization were selected from economic and business studies. For purposes of this master thesis, it is considered that an Agri-coop and FOs succeeds when it produces a commodity and help to solve problems regarding soil and water degradation in the members' farms trough SAPs adoption.

3.2.1 Cooperatives as business organizations.

A cooperative is a social group that acts as a business enterprise (NCBA, 2016). The business organization has the main purpose of generating a comparative advantage to compete in the market with other business organizations (USDA, 2012). These social organizations depend on individual behaviors which neoclassical economics theory assume are rational, completely informed, individualistic and try to maximize their own profit under an ideal market with complete information and without transaction costs (Hanisch & Opperskalski, 2010). New Institutional economics approach argues that individual rationality is limited due to incomplete processing capacity of information (Ibidem). In addition, the individuals act under a market with incomplete information where transaction costs exist (Ibidem). Under this new economic approach organizations are seen as opportunistic and egoistic individuals who take advantage of the information asymmetry among different individuals (Furubotn & Richter, 2000). With these characteristics four types of individual value orientations were defined: the cooperator, who wants to maximize collective outcomes; the competitor, who wants to maximize his/her outcome relative to that of others; the altruist, who wants to maximize the partner's outcome; and the individualist, who wants to maximize his/her own outcome (Kollock, 1998). Different research have found that competitor, cooperator and individualistic behavior profiles explained most of the empirical phenomena in our societies (Ibidem). In order to achieve a successful cooperative enterprise the cooperator profile needs to be promoted among its members. A successful cooperative puts the members' interests before profit maximization (NCBA, 2016; USDA, 2012). Therefore, a cooperative has to offer services and perform certain functions based on the members' needs and the community impact. According to different authors successful cooperatives societies, seen as business organizations, have in common basic functions and characteristics: a proper justification and provide information access.

Proper justification. Cooperative organizations need to establish a well-defined purpose and a reason to exist (Cook & Burrell, 2009). This justification has to offer a business competitive advantage in the market and provide specific products and services that its members' livelihoods depend on (Prager, 2015; Hanisch & Opperskalski, 2010).

Information access. One of the main advantages of cooperatives is its ability to access information and knowledge for its members, reducing information asymmetry and transaction costs and increasing awareness and perception about different situations (Prager, 2015; Nkonya et al., 2002; Ferguson, 2012). At the same time, cooperatives societies functions as an innovation platform that facilitate learning, and ensure participatory interactions to identify and implement solutions (Adekunle, et al., 2010; Mariami, 2013).

3.2.2 Cooperatives as self-help organizations.

Cooperative societies are social groups that organize collective action to solve common concerns. Even though collective action solutions bring mutual benefits, sometimes cooperation among individuals does not occur (Hanisch & Opperskalski, 2010). The problems associated with lack of collective action arise in the presence of externalities and occur when collective groups do not fulfill some collective pre-conditions (Elster, 2007). These collective action problems are identified as social dilemmas. According to Kollock (1998), social dilemmas are "situations in which individual rationality leads to collective irrationality". These social

dilemmas direct a situation in which everyone is worse-off (Ibidem). The most common social dilemmas are the free rider problem, common pool dilemma, public good dilemma (Hanisch & Opperskalski, 2010). All the social dilemmas are characterized by a “deficit equilibrium” situation that represents the condition in which all the persons involved could be better off in a specific situation but no one has the incentive to change their situation (Kollock, 1998). A successful cooperative has to contribute with specific social tools and characteristics that help to make decisions and overcome social dilemmas (Hanisch & Opperskalski, 2010). Some authors, including the Nobel Prize winner Elinor Ostrom, found certain determinants of successful social groups the collective problems in the management of natural resources (Agrawal, 2001). According to different authors, successful cooperatives societies, seen as self-help organizations, have in common some basic functions and characteristics: generate social capital, have internal rules and regulations, are socially inclusive, autonomous and have a particular size.

Social capital. The knowledge of past actions and behavior of members inside a social group create stronger human relations based on trust and reciprocity (Baland & Platteau, 1996). These cooperative values shape the quality of the interpersonal relations among the organization and promote coordination and collaboration (Agrawal, 2001; Franks, 2011). Therefore, the social capital forms the primary resource of an organization ruled on cooperative principles (Hanisch & Opperskalski, 2010; Valentinov, 2004).

Rules and norms. One of the fundamental factors for the success of cooperatives is the compliance of internal rules, regulations and norms of its members (Ostrom, 2005). These rules have to be a result of common understanding (Baland & Platteau, 1996). The physical proximity of the members promotes the collective self-monitoring of the performance and contributions of each member to the collective action (Wade, 1988; Agrawal, 2001; Franks, 2011). The peer pressure mechanism to comply with the agreed internal rules and regulations makes cooperatives an efficient organization for goal achievement (Franks, 2011). These rules and regulations have to be accompanied with clear incentives and sanctions in order to succeed. According to Ostrom (2005), low cost sanctioning mechanisms and a graduated system of sanctions are one of the main determinants for the successful management of common pool resources.

Inclusiveness. The diversity of members of a cooperative society is generally seen as a good health of the organization. However, it is necessary to point it out that in order to achieve a successful collective action goal and business performance it is necessary that cooperative membership have a minimum of understanding about their priorities and preferences (Wade, 1988; Ostrom, 1999). In other words, cooperative societies must reach heterogeneity in social aspects but homogeneity in interests among its members (Cook & Burrell, 2009; Baland & Platteau, 1996).

Autonomy. One of the lessons learned from the African cooperative societies was that organizations controlled and dependent on external groups' needs failed. It is important that cooperatives formation is based on an internal and autonomous group decision to reach their needs. In order to enforce the commitment and collaboration in the group, the

feeling of autonomy and ownership has to be appropriated by each member of the group (Trawick, 2008; Ostrom, 1999).

Group size. The influence of the size of a cooperative society in the success of its performance does not have a straightforward answer. Some authors argued that big groups increase the monitoring cost, reduce compliance and increase the free rider problem among their members (Baland & Platteau, 1996; Franks, 2011). In addition, in big groups it is more complicated to ensure homogeneity in preferences and easier to have elite capture problems (Francesconi, 2016). Besides, small groups are easier to control, to monitor, to exclude and avoid free rider problems among its members (Wade, 1988). However, the efficient cooperative size will depend on the production function, commodity and service provision characteristics, geographic conditions and the technology available (Agrawal, 2001; Hanisch & Opperskalski, 2010). As a business group a cooperative will reach the optimum size when their production and transaction costs reach their lowest levels (Ibidem).

Other variables found that determine organization success:

Governance structure. In cooperatives societies the structures and processes for decision making play an important role, due to the ownership control nature of these organizations (Bijman et al., 2012). After the market liberalization and the implementation of the new generation models, the African cooperatives have started to change their internal mechanism of direction, control and authority. In European countries, different organizational structures have been designed and nowadays cooperative societies are market oriented employing external professional managers (Nilsson & Madsen, 2007). It is still necessary to ascertain if managers, committees or other governance innovations improve the adoption rates of SAPs in cooperative members.

Leadership. Cooperative functionality depends on social and human capital. It is well-known that the development of human capital is a process that is necessary to develop inside all kind of organizations (Baland & Platteau, 1996). Cooperatives need leaders in their organizational structure who have knowledge about their members' characteristics and preferences, skills to deal with different situations and persons and capacity to "tinker" or adjust where the external conditions of the cooperative cannot be changed (Cook & Burrell, 2009). At the same time, a leader who knows the strengths, weakness, opportunities and challenges of the cooperative organization and its members will lead the cooperative to obtain solutions. Among the characteristics of efficient cooperative leaders are: pro-active participation, knowledge, education, capacity to motivate, create cohesion and inspire and flexibility to adjust when required (Franks, 2011).

External support. Besides the internal characteristics, cooperatives are also dependent on the environment where they interact (Baland & Platteau, 1996). Sometimes it is necessary to make structural changes to facilitate the performance of cooperatives; besides it is not possible to think that cooperatives societies can create all the conditions for their own success by themselves (Kollock, 1998; Münkner, 1976). The external influence factor can involve the legal system, government, social structures, among

others. In addition, access to external support could be a factor for success for a cooperative (Agrawal, 2001; Tesfay, 2005). The external support could be represented by the networks with the government, NGOs, extension services, financial institutions and market access (Nkonya et al., 2002; Baland & Platteau, 1996).

The collective action, economic and business studies were used to provide ideas and assumptions to define what the main functions and features that can define a successful cooperative society seen as business enterprise and a social group are. Identifying ten important internal determinants it is possible to test which of them generate a significant influence in the service provision for the adoption of SAPs among its members. The main services provided by agricultural cooperatives and farmer organizations found were presented and defined in the literature review section of this study. A conceptual diagram of the role of Agri-coops and FOs to facilitate the SAPs adoption through service provision is presented.

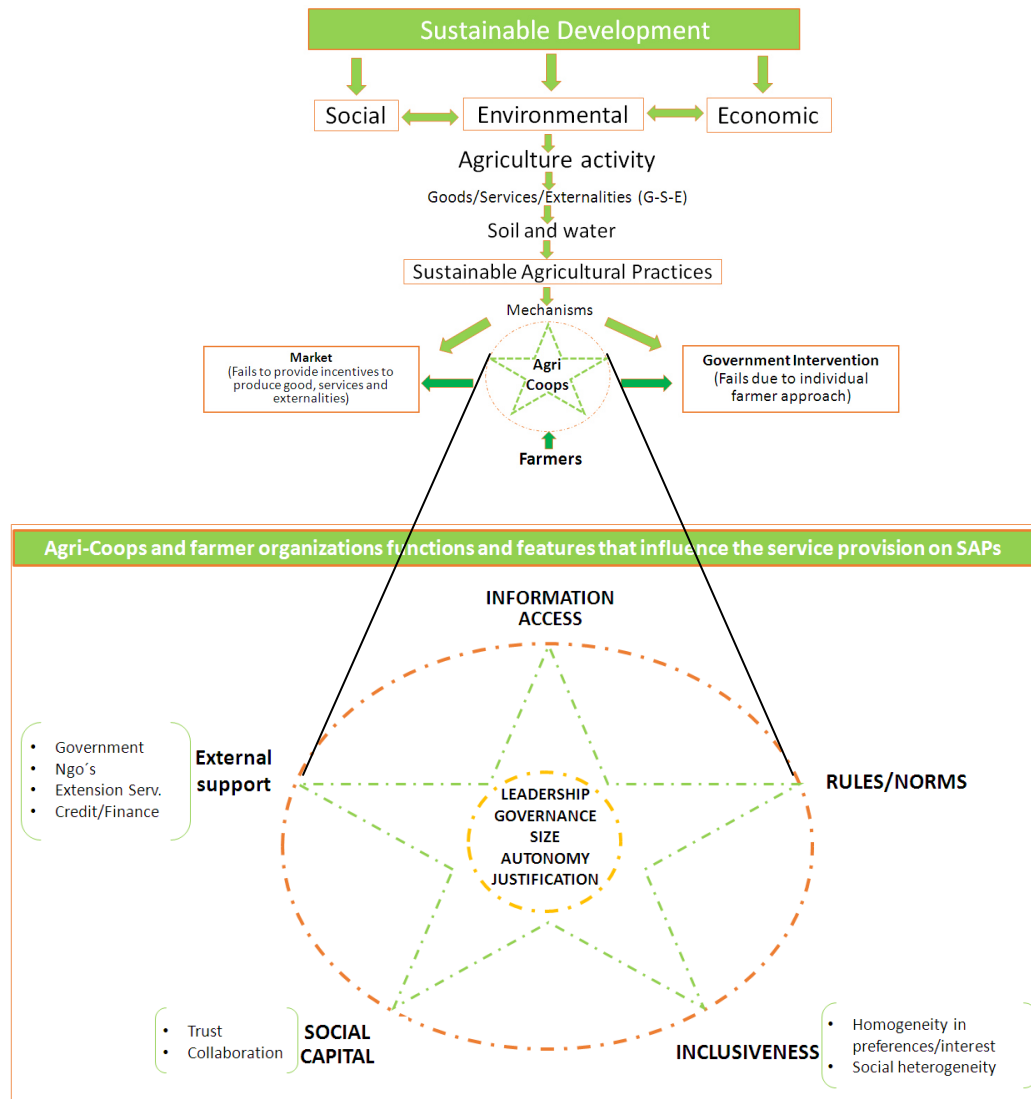


Figure 8. Functions and features that influence the SAPs services provision.

Source: Author's compilation from literature review.

Services provided among its members



Mutual work/labor support schemes; finance (credit/loans/grants); training/demonstrations; access to extension, advisory and information services; inputs supply, negotiate input and output prices; grades and standards; certifications; advocacy of programs and policies in favor of farmers.



SAPs members adoption

Chapter IV Research design and methodology

4.1 Research context: Uganda Cooperative Leadership Event

The Enhancing Development through Cooperative project (EDC) is an initiative that seeks to “...*promote the development of commercially viable, socially inclusive and environmentally sustainable cooperative agribusiness.*” (EDC, 2016). The EDC project is based on the action-research approach through learning by doing process, where the interactions between researchers and real practitioners are promoted (Ibidem). In addition, the EDC initiative instructs and prepares cooperative leaders, managers and service providers to facilitate the rise of a new generation of cooperative models. The EDC project generates rural development and agribusiness research in order to influence the policy and law making process (Ibidem). The EDC partnership is integrated by the International Cooperative Research Group (IRG) of the Overseas Cooperative Development Council (OCDC); The Decision and Policy Analysis (DAPA) Division of CIAT; The Enterprise Development Program (EDP) of OXFAM Great-Britain; and The Policies, Markets and ICTs (PMI) Program of the Technical Centre for Agricultural and Rural Cooperation (CTA).

In order to start with the EDC activities, in 2013 the EDC initiative proposed the organization of Cooperative Leadership Events (CLEs) across the developing world. The CLEs were defined as four-day events organized in different countries in order to gather fifty to seventy agricultural organizations managers and leaders per event (Ibidem). The aims of these meetings are: to collect data from Agri-coops and FOs; train and coach cooperative leaders in the Cooperative Life Cycle framework; and to engage Agri-coops and FOs leaders and managers in discussions with governments and institutions related with market governance, agribusiness and finance (Ibidem). Between 2013 and 2014 the first CLEs were organized in Senegal (2) and Ethiopia (1). These three events convened more than 80 cooperatives leaders, managers and cooperative development experts from international organizations, donor agencies, NGO's and research institutes (Ibidem). These events reached the CLEs objectives and helped to start a cooperative and development research network.

After the successful CLEs experiences in Senegal and Ethiopia, the EDC initiative set Uganda as the third country to organize a CLE. The author of this study found an important opportunity to collaborate in the organization of the CLE in Uganda and also to collect the necessary data for his research interest.

4.2 Research Design

In order to answer the research questions for this master thesis it was decided to use deductive analysis. According to Blackstone, in deductive analyses “...*the researcher studies what others have done, reads existing theories and then tests hypotheses that emerge from those theories.*” (Blackstone, 2016). Therefore, it was decided to collect data and examine if the ten determinants defined in the theoretical approach section have a positive correlation with the number of SAPs services provided by the organizations. Table 3 presents the hypotheses of the ten determinants and their expected correlation with the dependent variable.

Determinants	Hypothesis
Access to information (2 variables).	-The access to knowledge and expertise will provide more awareness to their members and they will request more SAPs services to their organizations. -Leaders that have information about the soil and water problems in members' farms will provide more SAPs services in their organization.
Rules and norms	-Organizations with SAPs internal production rules and norms to comply will provide more SAPs services among their members.
Social capital	-Relationships based on trust and collaboration are the foundation to provide SAPs services among the members.
External support	-External support from NGOs, research institutes and governments to Agri-coops and FOs facilitates the provision of more SAPs services.
Inclusiveness	-Different points of view and membership heterogeneity increase the provision of diverse SAPs services that can solve the members' problems regarding natural resources.
Governance	-An organizational structure with board of members, committees specialized in SAPs and with a manager will provide more SAPs services.
Autonomy	-Independent organizations that have freedom in their decision making process will create and provide more SAPs services that fulfill their member requirements.
Size	-Organizations with more members require more SAPs services in order to satisfy their members' requirements.
Leadership (2 variables)	-Leaders with a collective sense will try to promote more SAPs in their organization. -Board members who were trained in SAPs will promote the provision of more SAPs services in their organization.
Justification	-Organizations whose objectives and priorities are focus on the better management of natural resources and environmental sustainability will promote provide more SAPs services.

Table 3. Determinants hypotheses.

The analysis was done from primary data collected during the first day of the CLE in Uganda and two field visits to Agri-coops and FOs. The data was collected through quantitative and qualitative research methods. The reason to choose mixed research methods is due to the capacity to get better results of the factors and determinants that explain and describe a particular behavior or situation (De Steur, 2015; Mariami, 2013). In social sciences research, the quantitative approach helps the researcher to prove the correlations between different independent variables and dependent variables through statistical procedures (Mariami, 2013). At the same time, a qualitative approach helps the researcher to provide the reasons for behaviors, relations, context and social dynamics that cannot be measured by numerical approaches (De Steur, 2015). The combination and integration of quantitative and qualitative research methods allows the weaknesses of one method to be counteracted by the strengths of the other (Ibidem). The complementarity of the research outcomes between quantitative and qualitative methods help to obtain wider, stronger and triangulated results (Mariami, 2013). This master study aims to understand the role of Agri-coops and FOs on SAPs adoption in Uganda. The quantitative research focuses on measuring significant statistical variable correlations between the SAPs service provision and internal organization features and characteristics. The qualitative research focuses on describing the internal and external features and characteristics of SAPs services provision and explains the nature of their relationship with the organization and its farmer members.

4.3 Data collection

The data required for this study depended on the collection of new information; this was done through primary data sources under the context of the CLE in Uganda. The quantitative data was

collected through ninety-nine individually structured questionnaires with closed-ended questions. The questions related to this study were added to the official CLE survey. Each questionnaire contained 300 questions divided in different topics that represent the interest of the EDC project and the researchers involved. The qualitative data was collected in two field visits with farmer organizations, using semi-structured interviews with opened-ended questions with the farmer organization staff and Participatory Rural Appraisal (PRA) tools in the discussion groups with farmer members. The author of this master thesis study was personally involved in the questionnaire design, data collection and field interviews to ensure the detection of possible errors and complement the results of the quantitative and qualitative analysis.

4.3.1 Data collection dates and locations

The quantitative data was collected during the first day of the CLE in the National Agricultural Research Organization (NARO), in Kawanda (0°24'38.9"N 32°31'56.4"E), Uganda on May 3rd, 2016. The qualitative data was collected visiting the Kalangala Oil Palm Growers Trust/Kalangala Oil Palm Growers Association (KOPGT/KOPGA) in Bugala Island (0°16'52.0"S 32°08'46.5"E) in the Kalangala district, Uganda between May 30th to June 6th, 2016; and Ddwaniro Integrated Farmers Association (DIFA) between June 7th to June 9th, 2016 in Ddwaniro sub-county (0°39'17.4"S 31°23'09.2"E), in Rakai District, Uganda.

4.4 Sampling procedure

The sampling units were defined using a sequence of steps established as follows. First of all, it was necessary to define the population. It was decided that the participants of the research had to live in Uganda and work in agricultural cooperatives or farmers organizations of the country. Secondly, due to the lack of a comprehensive list of Agri-coops and FOs in Uganda, a non-random sampling procedure was chosen. The “Judgment sample procedure” was selected; the choice of the sampling units was based on an a priori judgment, fixing which characteristics will contribute to the research interest. For this case, the “key cooperative development agencies” in Uganda played an important role inviting the participants who fulfill two main requirements: 1) the respondents need to have a common understanding of Agri-coops and FOs management. Therefore, that participants play a leadership role in their organizations seemed appropriate; 2) even though that english is the official language in Uganda, it was decided that the participants who were not able to understand it, would not be taken into account in this research. This criterion was established to ensure a good understanding during the CLE training and the survey filling process. Nevertheless, the limits of this criterion that might exclude some Agri-coops and FOs were acknowledged. With these parameters in mind the “key cooperative development agencies” were asked to invite a representative sample of the organizations that they support.

The third step on the sampling procedure was to determine the sample size. The research sample size was restricted by time and financial organization constraints. The final size of the participant sample in the CLE was 99 participants from 99 different Agri-coops and FOs covering different regions, ages, composition and status of the country. It is acknowledged that the findings may not be a Ugandan farmer organization representation, but the CLE organized was declared the largest cooperative and farmer organization meeting in the history of the country (EDC, 2016). Therefore, the information collected in the event will help to provide a better understanding of the agricultural cooperative and farmers’ organization situation in Uganda.

4.5 Research methods and instruments

4.5.1 Quantitative data

The quantitative research provides causal relations between different factors or variables utilizing highly structured methods (Kombo & Tromp, 2014; Mariami, 2013). Among the main benefits of using quantitative methods are the capacity to apply to a large group of people through surveys and experiments (Mariami, 2013). The quantitative methods allow generalizing the results among the participants of the survey using statistical tools (Ibidem). This method is helpful to predict and control the significance of relations among different variables (Ibidem). The main tools of the quantitative method are the questionnaires and surveys (Kombo & Tromp, 2014). The surveys allow the researcher to reach a bigger sample size in a confidential and rapid approach (Ibidem). The surveys also reduce problems associated with the interviewer influence on the interviewee's answers (Ibidem). Some of the quantitative data methods pitfalls are related with the low respond rates, lack of interaction between the interviewed and interviewer and the lack of control of missing answers (Ibidem). However, in the particular case of the CLE Uganda, all these pitfalls were successfully overcome due to the distribution of the participants at 13 tables within a master student as facilitator in each table. This strategy allowed the participants to clarify any questions regarding the questionnaire and also helped to speed up the answering process and to check if all the questions were answered. In addition, the questions were written in a simple and clear way, seeking to avoid suggested or guessed answers. Before presenting the official CLE questionnaire, the document was checked several times by Ugandan and international master students under the supervision of the experienced project director in order to review possible biases in interpretation, grammatical and question sequence errors.

The CLE questionnaire was divided into five sections as follows: the "ID" section questions, related to general information about the organization and the participant; the "0" section questions related to the environment in which the organization operates; the "A" questions related to the purpose characteristics of the participant organization; the "B" section questions related to the organizational design and the "C" section related to growth and problems of the participant organization.

4.5.2 Qualitative data

According to De Steur (2015), qualitative research produces findings arrived by other means than quantification or statistical procedures. Qualitative methods intend to provide a better understanding of a specific research topic under a particular context (Ibidem). The qualitative data was collected through semi-structured interviews applied to the organization staff. PRA tools were applied to DIFA and KOPGT/KOPGA staff and members. The information collected is presented in two cases studies. The organizations visited for the case studies were first met during the CLE in Uganda and were partially selected based on recommendations from "key cooperative development agencies" in Uganda that know which Agri-coops and FOs comply with the use of SAPs. In addition, the organizations were partially selected in order to have two different organization objectives approach; KOPGA/KOPGT is a successful business oriented organization and DIFA is a successful self-help oriented organization. With this approach in mind, the results of the two case studies show two different organizations and their performance on the SAPs service provision.

The reason behind the use of qualitative research methods was the flexibility to get a complete and detailed understanding of the research topic (Mariami, 2013; De Steur, 2015). In the case of Agri-coops and FOs there are a lot of factors, determinants and information that cannot be classified asked or organized in numeric form. Therefore, using qualitative methods it is possible to get comprehensive and in-depth insight into the functions and characteristics of the cooperative that influence the SAPs adoption among its members, get information that was not possible to get through quantitative methods and confirm or clarify information obtained in the survey applied during the CLE (Kombo & Tromp, 2014). In addition, the qualitative methods provided a historical picture of the changes that have taken place in the organization functions and characteristics from the creation of the organization until now, and complement the cross-sectional information collected with the quantitative data through the structured questionnaires (Mariami, 2013; De Steur, 2015). Despite that the application of these methods is time consuming and the analysis of the data can be problematic (Kombo & Tromp, 2014); the organization of the field visits and the answers presentation was planned carefully before starting with the field visits. The use of a case study to present the qualitative results helps to explore a holistic and real example of the phenomena within its context and using different sources of information provides an understanding of the SAPs adoption from a variety of actors' points of view. The case studies were elaborated using the information collected from the semi-structured interviews and PRA tools applied to the organization staff and members during the field visit.

-The Semi structured interview is a qualitative research method, which seeks to understand answers that describe the experiences of the interviewee through a conversation between two or more people (De Steur, 2015). The Semi-structured interviews are conducted with a fairly open framework, which allow for focused, conversational, two-way communication (FAO, 2015b). Unlike the structured interview, this kind of interview starts with open questions, the interviewer already made an identification of the main topics to discuss and also their possible connection with other issues that could help the research (Ibidem). As not all questions were prepared in advance, one of the prime characteristics of this method is its flexibility for getting novel questions and answers that can provide different approaches than the researchers originally had in mind (Ibidem).

-PRA is a social research tool-box that according to Be: *"...PRA empowers local communities to analyze their situation and allows the researcher to understand the community member's perception of the reality."* (Be, 2015). This social tool-box also provides a wide range of specific tools to use depending on the kind of information required (Be, 2015; FAO, 1999). This study applied the "Venn Diagram" and the "Seasonal Calendar" tools in order to collect more quantity and quality of data from the farmers members of the organizations selected. These tools it make possible to get more details and prove the consistency of organization staff answers (Be, 2015). The Venn diagram is a tool that helps to identify groups, institutions and individuals that work and interact with the community members (FAO, 1999). The Venn diagram also shows the degree of involvement and cooperation among the different external actors and discovers their influence over the social group under research. The Seasonal Calendar is a tool that helps to clarify, understand and identify seasonal activities of the livelihood of the community (Be, 2015; FAO, 1999).

4.6 Data analysis

4.6.1 Quantitative data: Poisson regression model

Regression analysis is a statistical procedure implemented in order to predict the value of a variable, called the dependent variable, based on the value of one or multiple variables, identified as independent variables (Lund & Lund, 2013). Multiple regression analysis is also used to determine the relative contribution of each independent variable and the overall fit of the model over the dependent variable outcome (Ibidem). There are different types of multiple regression analysis that analyze quantitative data, their differences vary depending on the type of variables that are involved in the analysis. Among the different regression analysis models Poisson regression is particularly used when the researchers are working with count data as a dependent variable with the essential assumption that all events have the same probability of incidence (Teklewold et al., 2012). In the particular case of this study the objective is to know if the number of services offered by the Agri-coops and FOs regarding SAPs is related to specific features and characteristics of the organization. The Poisson regression model seemed to be the best statistical model to use for this research due to the discrete and countable nature of the dependent variable involved (Ibidem). The common formula to represent the Poisson regression model is:

$$y_i = e^{\alpha + x_i \beta} + \varepsilon_i$$

$$i = 1, 2, \dots, n$$

The Poisson regression analysis is used when it is necessary to find the set of parameters (x_i) that make the larger possibility to obtain a particular set of counts (y_i), where α represents the intercept, β is a vector of parameters for each independent variable and ε is an error term.

In order to use the Poisson regression analysis it is necessary to understand that this statistical model assumes that the dependent variable has a Poisson distribution instead of a normal distribution; each participant had the same length of observation time; the mean and the variance of the dependent variable are similar, and the dependent variable outcome does not have an excessive number of zeros (IDRE, 2016). It also assumes that the expected value of the dependent variable can be modeled in a linear combination with the independent variables (Ibidem). According to Lund & Lund (2013), there are five main assumptions that the statistical model must comply with order to be analyzed under the Poisson regression analysis. Before running the Poisson model it is necessary to check if those assumptions are satisfied.

1. The dependent variable consists of count, discrete and positive numbers and it is recommended that the mean of the count value is less than 10.
2. There is at least one independent variable which can be measured on a continuous, ordinal, nominal or dichotomy scale.
3. There is an independence of observations. In other words, one observation cannot provide any information on another observation. One method for testing for the possibility of independence of observations is to compare standard model-based errors to robust errors to determine if there are large differences (see appendixes 3 and 6).
4. The distribution of counts follows a Poisson distribution. In order that the model can predict results accurately. The expected and observed counts should be similar. This can be checked with the plot of observed and expected counts (see appendix 1).

5. It is necessary to satisfy the assumption of equidispersion which means that the mean and the variance of the model have to be similar or almost identical. This can be checked with a summary of the dependent variable, the Deviance statistic test and Pearson goodness-of-fit test models (see appendix 4).

The statistical analysis was done using STATA V.11.2 software, and defining the following statistical model.

$$y_i = e^{\left[\alpha + PERC * \beta_1 + BMTD * \beta_2 + INFO * \beta_3 + RULE * \beta_4 + SOCA * \beta_5 + EXSU * \beta_6 + INCL * \beta_7 + GOVE * \beta_8 + AUTO * \beta_9 + SIZE * \beta_{10} + LEAD * \beta_{11} + JUST * \beta_{12} \right]} + \epsilon_i$$

Where:

y_i = Number of SAPs services offered by the organization.

PERC = Perception of the soil and water farms problems.

BMTD = Board members trained in SAPs (dummy variable).

INFO = Information access inside the organization (dummy variable).

RULE = SAPs rules, norms established inside the organization (dummy variable).

SOCA = Social capital (Situation of the tension, disagreements inside the organization).

EXSU = Access to external support from governments, civil society and/or private companies

INCL = Inclusiveness (number of women, young and smallholders members divided by the total number of members).

GOVE = Governance structure (board of members, SAPs committee, manager)

AUTO = Autonomy and independence of the organization.

SIZE = Size of the organization in terms of total number of members.

LEAD = Leadership skills of the participant.

JUST = Justification to create the organization.

4.6.2 Qualitative data: Case studies

The use of case studies to present the qualitative results helps to explore holistic and real examples of particular phenomena within their contexts, using different sources of information to explain them (Luna & Rodriguez, 2011). For this research purposes case studies will promote an understanding of what's, why's and how's about the adoption process that take place inside two FOs in Uganda. The qualitative information will be analyzed first through a categorization of the main conditions and determinants for each case study; identifying those categories that influence the most the service provision and adoption for the SAPs. The second part of the analysis consists of the identification of the most relevant patterns among the two case studies, comparing their similarities and their differences. The last part of the analysis is a written report with two case studies that describe and provide a picture of both farmer organizations and their role on the SAPs service provision and SAPs adoption.

Chapter V Data analysis and presentation of results

5.1 Main results

The following chapter is divided in two sections. The first section focuses on the quantitative results and is divided in two parts. The first part starts with descriptive statistics of explanatory variables used in the statistical model and general information about the characteristics of the organizations who participated in the survey. The second part, presents the results that explain the relations among the exploratory variables and the dependent variable. The second section of the chapter presents two cases studies with the description of the internal functions and features that influence the SAPs services provision and SAPs adoption of two Agri-coops and FOs in Uganda.

5.1.1 Quantitative results

5.1.1.1 Descriptive statistics

Table 4 shows the description of the variables used in the STATA model in order to answer the research questions defined for the study purpose. A table with the description of how each variable value was calculated is presented in Appendix 2. Following the descriptive table, a brief description of each variable is presented in order to have a better understanding of the sample and to have a clear idea of the situation of the Agri-coops and FOs who participated in the Cooperative Leadership Event in Uganda.

Definitions of the variables of the empirical model							
Variable	Obs.	Mean	Std. Dev.	Min	Max	Unit	Definition
Dependent variable							
NOS	95	3	2.015894	0	10	Number	No. of SAPs services provided.
Independent variables							
PERC	94	2.058511	.5708246	.5	3	.5=Not a problem 3=Big problem	Leaders' perception regarding soil erosion, soil fertility, water scarcity and water pollution problems (average).
BMTD (dummy)	93	.6774194	.4699975	0	1	0=No trained 1=Trained	Board member trained in SAPs
INFO (dummy)	95	.1894737	.3939634	0	1	0=No use of ICT 1=Use of ICT	Information access.
RULE (dummy)	89	.752809	.4338228	0	1	0=No rules defined 1=Rules defined	Rules, norms and standards related to SAPs established.
INCL	91	.4863832	.1779503	0	.93	0=Less inclusive .93=More inclusive	Inclusiveness ratio= number of women, young, smallholders and illiterates members divided by the total number of members.

SOCA	95	5.947368	2.135657	1	8	1=Disagreements increased over time 8=Disagreements decreased over time	Social capital (frictions, tensions or disagreements among members and leaders)
EXSU	93	1.376344	1.197043	0	4	0=No support 4=Biggest support	Financial external support (government, civil society and private companies)
LEAD	91	4.648352	1.336443	1	7	1=Less skills 7=More skills	Leadership skills.
2.JUST (dummy)	95	.2105263	.4098452	0	1	0=Marketing and adding value 1=Access to better prices and services	Justification of the organization at the start.
3.JUST (dummy)	95	.2	.402122	0	1	0=Marketing and adding value 1=Self-help and mgmt. of natural resources	Justification of the organization at the start.
SIZE	91	366.7363	770.0661	10	5000	Number of members	No. of members in the organization at the start.
AUTO	94	1.244681	.8760391	0	2	0=Outsider 1=Outsider/Member 2=Member	Autonomy. Who introduce the idea and lead the efforts to establish the Agri-coop or FO.
GOVE	91	2.846154	.8809474	0	4	0=No SAPs oriented 4=SAPs oriented	Governance structure SAPs oriented.

Table 4. Summary of dependent and explanatory variables.

Respondents' information

The total size of the sample is 99 leaders from 99 different agricultural cooperatives and farmer organizations in Uganda. The average age of the respondents was 42.6 years and only 28% of them were female. In addition, 38% of the respondents claimed to have a bachelor degree or higher education certificate or diploma. Regarding the role that the participants play inside their farmer organizations, 35% of them are the managers, 57% are members of the board of directors, 2% are part of an internal committee and the rest of the respondents (6%) are technicians or ordinary members. Finally, 97% of the participants consider themselves as farmers.

Organization information

The organizations were invited by “key cooperative development agencies”, and they came from different parts of the country; 19% came from the central region, 30% from northern, 17% from eastern and 33% from the western region of Uganda. The mean distance from Kampala, the capital city, to the organizations location is 300 kilometers. The average age of the organizations is 10.16 years and 50% of the organizations have between 10 and 386 members. The study shows that 27% of the land and 63% of the water resources used by their members are owned by their community or village. Moreover, 75% of the organizations comply with the national cooperative legislation, 61% are registered in a national or regional farmer union and 25% are registered in the chamber of commerce.

Justifications, priorities and autonomy of the organizations

The results show that the main purposes to establish the organizations were: to add value of the production (marketing and processing) to compete in the market (57%), to get access to aid, grants, credits, subsidies and better input and output prices (24%) and to help farmers help each other and to have a better management of natural resources (8.1%). Regarding sustainable development pillars, the number one priority of the agricultural cooperatives and farmer organizations found were: economic growth (80%), social welfare (14%) and environmental sustainability (6%). The survey results show that only in 57% of the cases the idea to establish the organization was introduced by somebody who was or still is a member of the organization and only in 68% of the cases the efforts to establish the organization were led by somebody who was or still is a member of the organization. Finally, organizations claimed to have received an initial grant in 46% of the observations or an initial credit/investment to establish themselves in 21% of the observations.

Access to external support

The statistical information shows that 46% of the organizations received a grant in the last year from which 96% of these grants came from the civil society (international NGOs or donors). On the other hand, 25 % of the organizations claimed to had received a credit or an investment in the last 12 months; from which 53% came from private companies (investor, banks or service providers) and 28% came from the civil society.

Production and services provided

Related to the activities performed, it was found that on average the organization produced 2.8 Agri-commodities, where 58% produced cereals (wheat, maize, etc); 28% roots and tubers (potatoes, cassava); and 22% oil seeds. Regarding the services provided to their members, the results show that trainings and demonstrations are provided by 81% of the organizations; extension, advisory and information services by 67%; collective marketing by 65% and negotiating of input and output prices by 52% of the cases. It is also necessary to point out that in 81% of the organizations non-members are allowed to sell their output through the organization and 56% of the organizations also provide their services to non-members farmers. Finally, regarding collective marketing 75% of the organizations answered that they suffered from side-selling in a range that varies from 1% to 44% of the total member's production.

Governance structure

Ninety-four percent of the agriculture cooperatives and farmer organizations declared to have a board of directors of which 97% of the organizations answered that they elected their board members democratically, through the one member one vote principle. The average size of board of directors is 8.8 members, where in 89% of the cases the board members perform their role on a volunteer basis (without any payment). In addition, 85% claimed to have at least one committee to discuss topics relevant to the organization. On average the number of committees per organization is 3. Finally, only 59% of the organizations have a manager hired from outside the organization where 65% of them have a bachelor or higher educational degree certificate or diploma.

Inclusiveness

In order to understand the social heterogeneity of the membership in each organization, an inclusiveness ratio was developed which calculated the number of marginal society members

(women, youth, smallholders and uneducated) over the total number of members of the organization. The results show that 50% of the organizations have a ratio that varies from 0% (no inclusiveness) to 54% (more than half of their members belong to one of these vulnerable groups).

Social capital

The social capital was measured through the perception of disputes, tensions and disagreements among members and inside the governance structure. The study show that 9.2% of the respondents think that disputes, tensions and disagreements in general assemblies, board members, and among members and leaders, significantly increased over time; 28.5% considered they stayed more or less the same; and 62% answered that significantly decreased over time.

Leadership

Regarding the leadership skills, 93% of the respondents consider important to identify a common purpose before to establish a farmer organization. Only 42% of the participants considered it important to focus on an internal vision in order to prevent the changes that will take place in the organization over time. Besides, 57% answered that before receiving any credit or grant it is necessary to have an internal consensus and define the organizations constitution and bylaws. Just 40% of the leaders considered that the main reason to change the constitution and bylaws is to address changes in members, their needs and their interest that may occur over time. Finally, 87% considered that in order to solve an internal problem it is necessary to listen to all the opinions, understand the nature of the disagreement and smooth internal frictions, proposing a sense of unity, common purpose, and inspiring cohesion inside the organization.

SAPs

The perception of the participants regarding soil fertility problem is that 50% of the organizations considered it a big problem, affecting the members' income; 35% of them considered that soil erosion is a big problem, 36% that what scarcity is a big problem and 18% that water pollution is a big problem. In the case of the services provision related to SAPs to face the previous problems; the results show that trainings and demonstrations are provided in 69% of the organizations, information services in 61%, advocate policies and programs on behalf farmers in 29% and regulate access to land, water, forest and pastures in 29%. Regarding the most influential and reliable source of information for SAPs, 26% of the organizations considered NGOs and donors as the most important, in second place with 22% the radio and in the third place with 13% was considered the government agencies (any level) as the primary source of information for SAPs. Related with the governance structure, 60% of the organizations answered that they have a SAPs committee; 66% declared that at least one board member is trained in SAPs. From the total number of organizations who answered to have a manager only 62% of them answered that their manager is trained in SAPs. It is also important to mention that 74% of the organizations have established norms and rules to comply with SAPs among their farmer members. In addition, the main problems identified that are preventing the organizations to provide more or better SAPs services are: the lack of means to do it (60%), and "other" reasons (lack of finance and funds mostly) with 18%. Finally, the main causes that prevent members to adopt SAPs are: unfavorable geographic conditions (41%) and "other" causes (lack of knowledge, information, skills and awareness of their members) with 31%.

5.1.1.2 Inferential statistics

After having confirmed that the dependent variable followed a Poisson distribution; checked possible correlations among the variables; made the Deviance test statistic and Pearson goodness of fit test and made robust regression analysis; all the assumptions to use the Poisson regression model were satisfied. The Poisson model fitted the data reasonably well and the model was highly significant as indicated by the Chi-square (Prob > chi2=0.0017), which supports the existence of a relationship between the dependent and the explanatory variables. The Pseudo R2 suggests that almost 11.62% of the total variation in the values of dependent variable is explained by the independent variables. The directions of responses of eleven of the variables are positive as were hypothesized. The variable exceptions are the justification (2.JUST), and governance structure (GOVE). The results deviate from the findings in the literature review which showed positive relation of these organization characteristics in the success of the organization.

Independent Variables	Model Result	Independent Variables	Model Result
PERC	0.359** (0.148)	LEAD	0.0770 (0.0597)
i. BMTD	0.109 (0.171)	2.JUST	-0.149 (0.196)
i.INFO	0.631*** (0.201)	3.JUST	0.107 (0.196)
i.RULE	0.220 (0.197)	SIZE	0.000172* (9.00e-05)
INCL	0.325 (0.423)	AUTO	0.166* (0.0975)
SOCA	0.00128 (0.0376)	GOVE	-0.140 (0.0984)
EXSU	0.136** (0.0605)	Constant	-0.678 (0.529)
Prob > chi2	.0017		
Pseudo R2	.1162	Observations	73

Table 5. Results from Poisson regression model.

Coefficients

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results show that the perception (PERC) of the Agri-coops and FOs leaders regarding problems on soil fertility, soil erosion, water pollution and water scarcity in the members' plots have a significant and positive (at 5% significant level) impact on the number of SAPs services provided by the organization. The results suggest that the higher the problems perceived by organization leaders, the more likely they take decisions to establish more and better services to solve them. This result expand the results of Wollni & Andersson (2013); Haghjou et al. (2014); Asafu-Adjaye (2008); who argued that the perception of a specific agricultural problem influenced significantly the rates of adoption of new practices by a farmer.

The results related with trainings received by the board of members (BMTD) regarding SAPs, show that there is not a significant determinant for providing more SAPs services inside the organization. This result contradicts Franks (2011) statement that leader's knowledge and education, are necessary to take organization decisions regarding services and other organization activities. However, the information access factor (INFO) represented by the use of the information and communication technologies (ICT) inside the organizations is significant at the 1% significant level and positively related with higher number of SAPs services provided. This result confirms the findings from Prager (2015); Nkonya et al. (2002); Ferguson (2012) who argued that access to information help members to deal with farm problems, reducing transaction costs and asymmetry of information. Therefore, with more access to information members can request for more and better services to their organizations in order to solve their problems. A second explanation of this correlation is that big farmer organizations, represented by their capacity to establish ICTs, have more financial means to provide a diverse number of SAPs services to their members.

The Poisson regression results indicate that the leadership skills (LEAD) and rules established (RULE) to comply with SAPs inside the organizations are not significant determinants to provide more SAPs services, neither the social capital (SOCA) nor the justification (JUST) to establish the organization. These results do not confirm the statements found in Baland & Platteau (1996); Cook & Burrell (2009); Agrawal (2001); Franks (2011); Prager (2015) studies who mentioned that these determinants are important for a successful Agri-coops and FOs. On the other hand, external support (EXSU) represented by grants, loans, investments and credits received from the NGO's, private companies and governmental institutions, have a positive and significant effect on the number of services provided (at 5% significant level) by the Agri-coops and FOs. This result confirms the necessity of financial capital in order to expand the number of services that an organization can offer to their members. This outcome is also aligned with the information found in the literature review regarding farmers SAPs adoption determinants, on the studies made by Teklewold et al. (2012); Roufahi (2015); Haghjou et al. (2014); Tosakana et al. (2010); Long (2003). In these studies, the authors argued that external actors' support is crucial to solve financial constraints and increase the adoption rates of sustainable agricultural practices among the farmers.

The statistical analysis results show that inclusiveness (INCL) and governance structure (GOVE) are not significant determinants that affect the number of SAPs services provided by the organizations. These results opposed to Nilsson & Madsen (2007); Cook & Burrell (2009); Baland & Platteau (1996) studies who stated that these determinants provide a diversity on points of view and a better decision making process regarding the group activities. Nevertheless, the autonomy (AUTO) of the organization is significant at the 10% significance level and positively impacts the number of SAPs services provided. This is probably because autonomy represents the capacity of the organization to take their own decisions in benefit of their members and also to find proper and efficient solutions to solve their problems. This result confirms Ostrom (1999) and Trawick (2008) findings who mentioned that autonomy enforce the commitment and collaboration in the group and improve its performance.

Finally, the inferential analysis shows that the size of the organization is significant at the 10% significance level and positively impact the number of SAPs services provided. In other words, the greater the size, the greater the number of services provided by the organization. This result contradicts the arguments provided by Baland & Platteau, 1996; Franks, 2011; who stated that big groups have less homogeneity in preferences, increase the monitoring costs, reduce compliance and increase the free rider problem among their members; complicating the services provision. However, this correlation can be explained in three different ways. The first one is because the greater the organization size, the greater the possibility that their members have problems with their natural resources; therefore, the greater the necessity to create different services to solve them. The second explanation is that the greater the size, the greater the financial capital that can be collected from their members fees gained from their economic activities and from the contribution of their networks to finance more services. Finally, a third reason is related with the fact that the greater the size of the organization, the greater the human capital available to be used in order to provide more services. The last two explanations are related with the fact that a business farmer organization will reach the optimum size when their production functions and transaction costs reached their lowest levels (Agrawal, 2001; Hanisch & Opperskalski, 2010).

In this study, it was hypothesized that there is a significant correlation between the number of SAPs services provided by Agri-coops and FOs and their internal functions and features. This hypothesis was examined by testing twelve variables using the Poisson regression analysis. The results of the statistical model show that five organizational determinants influenced, in a significant level, the probability to offer a higher number of SAPs services to its members. This implies that the null hypothesis which states that there is no significant relationship between the number of SAPs services provided by Agri-coops and FOs and their internal functions and features is rejected in five of the variables.

5.1.2 Qualitative results

5.1.2.1 Case study one: Ddwaniro Integrated Farmers Association (DIFA)

Introduction

DIFA is an association of banana growers located in Ddwaniro sub-county, in Rakai District of Uganda. The association started on 2001 as a necessity to solve the low yields that farmers faced in the region. The first years were a learning process to get information on how to solve their productivity problems. In 2003 the growers decided to register as a Community Based Organization (CBO) and defined targets to solve problems related with soil, pests and diseases in their banana farms. The first activities and services offered by DIFA were to provide information and training related with soil erosion, soil fertility and management of natural resources. After some years of making networks with different research institutes, NGOs and extension services, DIFA created information platforms and communication strategies to distribute and disseminate information on SAPs through participatory development communication tools. These tools involve dramas and the production of songs; photographs; posters; on-farm visits; and demonstrations plots to inform banana growers how to improve the condition of their natural resources and increase their productivity. The strategies were a success and the banana growers started to increase their yields.

After years of success and disseminating this knowledge, their membership increased significantly and they started to face some organizational and service provision issues that they were not ready to face. In 2003, they decided that it was necessary to update their bylaws in order to control the membership growth and define their activities and services. As a consequence of these new constitutions, they created a board of directors; five committees; Village Farmer Groups (VFGs); and defined specific goals and activities to improve the adoption of SAPs and access to market among their members. Some of the activities created were: “farmer to farmer training program”, radio station alliances, water harvesting program, revolving loans schemes, a SACCO creation, collective marketing, market alliances, and national and international alliances with extension services, NGOs and research institutes. During the last years, the activities and services offered by DIFA have been a success. In the last year DIFA had the opportunity to access international markets, being a pioneer in Uganda on the banana exportation to Europe and United Kingdom.

Perception, justification and autonomy

Rakai region is well-known in Uganda for its banana production. However, during 2001 in Ddwaniro sub-county, the farmers realized that the banana production was not enough to sustain their livelihood. Based on the National Agricultural Research Organization in Uganda (NARO) initiative, a research program in Ddwaniro area was implemented to understand the agriculture production problems in the region. Ddwaniro farmers participated in NARO communitarian diagnosis where they had the opportunity to express their concerns and perceptions of the productivity problems. Among the most important problems perceived by the banana growers were: a decrease in the banana yields during the last 30 years, soil erosion, soil degradation, water scarcity, lack of technical information and food insecurity.

With these common problems perceived by Ddwaniro farmers, a community member who works as an extension officer looked the opportunity to create the CBO in order to have access to knowledge and share information to solve their problems. Ddwaniro farmers decided not registered as a cooperative organization due to the bad reputation that these types of organizations have in the country. According to DIFA members: *“In Uganda, cooperatives are synonym of failure, corruption and are “elite” controlled organizations; we wanted to create benefits for the farmers and their families ,no profits; we want to move out of poverty and create food security in our communities.”*(Interview with Daniel Birimuye, 07.06.2016).The idea of the organization was encouraged by NARO researches based on their findings that showed a lack of agricultural services provision in the region.

With this idea on mind, DIFA set as their organization mission *“To create communication between rural farmers and agencies that boost agricultural production and natural resources management in the community through a coordinated approach.”*(Interview with Enoch Lwabulanga, 07.06.2016).The main objectives established are:

- To foster unity among various stakeholders of agriculture, livestock and natural resources management in the sub-county.
- To promote agriculture, livestock and sustainable natural resources development activities in the community.
- To educate the community about production and marketing aspects and their involvement in development initiatives.

- To ensure the participation of women, youth and people with disabilities in developing activities in the sub-county.
- To carry out any other activity that will facilitate the attainment DIFA objectives.
- Advocate for the right of farmers.

Despite the intellectual support received from NARO at the beginning of DIFA establishment in 2001, the organization defined its autonomy from any government, organization or other external actor in their decision making, activities and services provision. The latter was clearly defined in the first bylaw in 2001 and were ratified in the bylaws modifications made in 2003. In the last constitution the DIFA council was defined as a composition of all registered members of DIFA, and the only mechanism to decide the association mandates, priorities, activities and the overall DIFA's policies.

Services provided

During the last 13 years DIFA's main goals have not change and they are working to improve the sustainable management of their natural resources; to increase the yields and to improve access to national and international markets. In order to accomplish these goals, DIFA has been working in different services provision to their members.

Information, trainings and demonstrations services. These services embrace different SAPs such as: intercropping, mulching, application of manure, composting, water retention structures, reforestation, nurseries, mother gardens and production of local and high demand banana varieties. These information services involve trainings, demonstrations and different dissemination strategies such as the "farmer to farmer training program"; where according to DIFA staff "...the best approach to teach a farmer a new agricultural technology is having another farmer from the same community teach him about it." (Interview with Daniel Birimuye, 07.06.2016). Another strategy is the radio station alliance, at regional and national level, in which DIFA members have a daily program to talk about soil and water problems and their solutions. This strategy also focuses on generating information materials such as: brochures, pictures, posters, videos, songs and dramas to explain, about the soil and water problems in banana plantations in their own native language. It is important to mention that after all these experiences, DIFA experience has been recognized by other development organizations and by the National Agricultural Advisory Services of Uganda (NAADS).

Credits and loans services. In 2003 DIFA understood that farmers needed money to adopt the sustainable agricultural practices that they promoted, therefore it was necessary to create financial mechanisms that provided credits, loans with low interest rates in order to invest in these practices. After having offered revolving loans schemes for 5 years, in 2008 DIFA decided to create the SACCO "Tereka". This SACCO was created in order to provide loans to their members for hired labor, to buy manure, mulch, and inputs in order to ensure the implementation of SAPs. The loans and credits were offered just to DIFA members and the money had to be used specially for SAPs implementation. The members who asked for a loan had to bring a cost-benefit analysis where they had to prove that the loan required would increase their banana production and that would have enough revenues to pay the loan back.

Collective marketing services. After increasing the yield production and ensuring the quality and quantity of the natural capital of most of their members, DIFA next step is to focus on the collective marketing. In addition, the creation of this program was the result of a disorganized Uganda internal banana market, where the price of the bananas varies significantly from different regions and seasons and the producers have limited bargaining power. The main objective of this service is to link their members with buyers. The members have to comply with SAPs and avoid chemical fertilizers in order to benefit for collective marketing services. DIFAs approach is based on the sustainable production of bananas that have a high demand within international markets. Part of the strategy is to create contacts, market alliances, meetings with brokers and traders and show them videos, organized field exhibitions in order for them to check the quality, quantity and the production process of their banana growers. These services also focus on improving the value addition of banana products through trainings in post-harvest, handling and the creation of storage and processing facilities.

According to DIFA's members, the services provided by the organization had helped them to get information, trainings, demonstrations, technical expertise, financial capital and market access to improve the management of their natural resources and increase the members' profits.

External support and information access

Without a doubt, the external support has been an important strategy for DIFA organization growth and development. The role played by NARO in 2001 working with a methodology that allowed the Ddwaniro farmers to understand their own problems and created their own solutions, was the starting point with future NARO collaborations. The first training program in soil and water management was provided by NARO which consisted in experimenting different SAPs and validated the best practices that could be integrated into the production of bananas. The next NARO collaboration was to implement the participatory development communication tools that consisted in the generation of materials to promote the farming practices implemented in the field, such as songs, dramas, movies, photographs, posters and demonstrative gardens. NARO also introduced the idea to organize competitions among the farmers' plots in order to promote the adoption and implementation of best practices through the members' action. The collaboration with NARO contributed to DIFA's goal to have access to external support in order to provide more and improved services to their members.

As a result of the successful collaboration with external consultants and donors, DIFA decided to add research institutes, extension services and NGOs as part of its organizational structure in order to improve their services through knowledge, trainings and certifications. This strategy has been an important factor for the success of DIFA service provision. Between 2004 and 2008 DIFA received different support from national and international organizations, universities and research institutes to finance, maintain and improve the organization functions. Most of the support received was through: awards; grants; inputs and trainings to increase the dissemination of information and facilitate access to international markets, create finance mechanisms and create demonstrations plots. The development of the partnerships among different actors has provided access to information which was fundamental in increasing the number of services provided to the DIFA members. Since 2015, DIFA is using internet platforms to improve

information access, contacts and markets in order to better their sales and management of their natural resources.

Size, inclusiveness and rules

Since 2008 the numbers of members was restricted and kept constant at 461. DIFA decided to maintain the membership size constant due to the lack of financial capital to expand the service provision on the field. From the total number of members, 175 are males and 286 are females. DIFA policies seek to include the youth and physical disable members inside the organization. In 2016, the average age of DIFA a member is 40 years and integrates 6 of its members are persons with physical disabilities and the average educational experience is ten years. The DIFA requisites to accept a new member are based on: reputation of the person among his/her community; to hold a banana plantation; be able to pay a membership fee and a monthly fee; be a permanent resident of the parish; be 18 years or older and be willing to assist to the VFGs meetings. DIFA board of directors' review the application of every new member of DIFA, these applications have to be authorized by the VFGs leaders, according to his/her behavior and reputation. DIFA leaders also verify motivation and purposes of behind each new candidate that wishes to belong to the organization in order to avoid opportunistic behavior in their members. According to DIFA staff, the heterogeneity among their members has helped to learn from different personal approaches and different problems in order to provide more and tailored services that can solve their members concerns.

Regarding SAPs production rules or sanctions, DIFA complies with the national environmental protection act and with district regulatory measures. In addition, they comply with the National Bureau of Standards of Uganda (NAS) for the exportation of their products. However, according to their members, the best certification is the reputation achieved in the region regarding the way that DIFA members produce and manage their natural resources and the quality of their production. As it was mention before, there is an "informal" rule inside DIFA that states that the member who want to participate in the collective marketing services have to comply SAPs standards; avoid chemical fertilizers; attend DIFA's trainings and be recommended by the VFGs leaders. Despite the environmental friendly production, the produce is not compensated with any premium in the national market and they receive the same price as a "normal-produced" banana. Therefore, the current DIFA approach is just to focus on the international market to sell their produce at a premium price.

Leadership and governance structure

Any member of DIFA can be elected into a leadership position in the organizational structure as long as the assembly considers that he/she has the qualifications. The most important skill required to be a DIFA leader is to demonstrate to have the experience and information to solve production problems in the members' plots. Therefore, this leadership characteristic allows the organization to be leaded by persons with a high capacity to take decisions regarding the quantity and quality of the services provided by the organization. At the establishment in 2001, DIFA leaders were elected from the first group of farmers trained by NARO and other extension officers in SAPs and sustainable management of natural resources. It is important to mention that all leadership positions are executed on a volunteer basis, without salary or in-kind compensation. DIFA governance structure consist of a board of directors, extension researchers

and consultants, 5 committees, 47 VFGs and a council integrated by 461 farmers. Each leader position within the governance structure has duration of 3 years.

The board of directors meets at least 3 times a year and consist of a chairman, a vice-chairman, a general secretary, a secretary of information, a treasurer, a youth representative, an organizer, a women's representative, representative of the physical disabled and a technical officer. The five committees were established to have a forum where members can discuss, ad-hoc topics and perform specific functions that are relevant to the association services. The loans committee has the responsibility to manage the SACCO, and revolving loans schemes and provides information on how to design profitable banana projects amongst its members. The finance committee is in charge of managing all organizational finance capital and assets, membership fees, cost-benefits analysis of different projects, the monitoring of finance health programs and services provided by the organization and advise the board of directors on how to obtain more finance capital. The water harvest committee focuses on resolving water requirements of the farmers, sensitizing members and providing them with information and knowledge regarding the water management and the organization of collective action to build water infrastructure. The marketing committee has the responsibility to create and improve the conditions for the collective marketing and access to national and international markets to sell the members produce. The agri-environmental committee is in charge of satisfying all production requirements necessary in order to increase banana production yields, sensitize members and provide them information and knowledge regarding the sustainable management of their natural resources and organizing collective action to implement sustainable agricultural practices.

The members are organized in 47 different VFGs from five different parishes inside the Ddwaniro sub-county. The VFGs structure help is designed to with the self-monitoring of the implementation of best practices, loans payments, information dissemination and communication and bureaucratic activities between the members and board of directors and committees. The general assembly or council is formed by 461 members and they meet at least twice a year and take relevant decisions and elect their leaders democratically on the basis of the principle of "one member one vote".

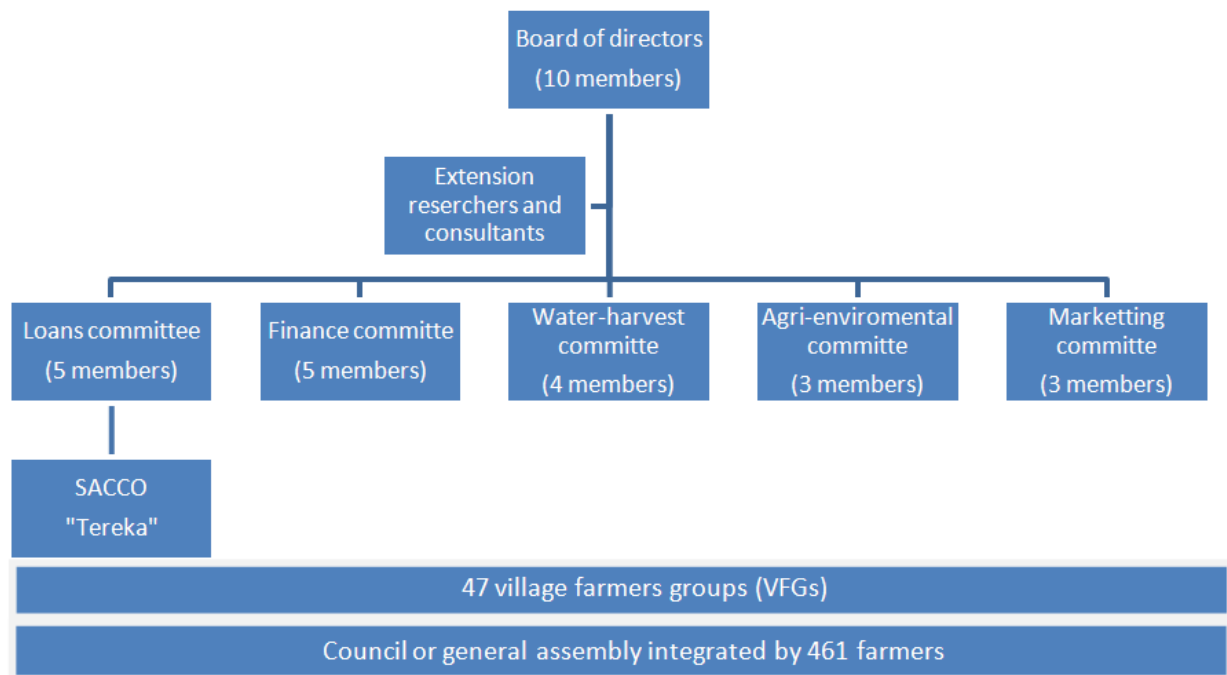


Figure 9. DIFA organizational structure.

Source: Author's creation from DIFA interviews.

Social capital

As it was mentioned before, the farmer's reputation is a crucial determinant for being accepted into the organization. A good reputation is defined in terms of honesty, service to community and hard-work. These are the necessary values that will ensure that the member will take a positive advantage of the services provided by the organization and in turn benefit other members. The organizational structure is based on VFGs whose activities include sharing experiences, knowledge and advise in reference to the management of banana plantations; providing market information; listening to the concerns of other members and determining responsibilities amongst the members; setting deadlines for specific activities and service provision; and to monitor the collaboration between members, loan payments and solution implementation to improve plot conditions. Each VFG leader has to insure that group activities, time and resource are managed wisely in order to satisfy the members' needs. The village farmer groups have meetings every two weeks to plan collective action activities such as: the building of water-harvest tanks; providing collective maintenance to members plots; "banana bacteria wilt" control, that can destroy an entire plantation in one day; the implementation of SAPs that require a integral watershed management approach, for the control of stream flows with trenches needed to reduce soil erosion; and collective marketing organization.

Current situation

The most important achievements mentioned by DIFA members correspond to the banana production. According to DIFA, their production increased from 25 to 40 kilos or more per bunch (a 60% increase) on their members plots. This increase is related with the use of SAPs, improving the quality of soil which increased the size of the bananas bunches. The increase in soil fertility also improved the quality on the color, texture and taste of the bananas produced.

Regarding the implementation of SAPs, DIFA staff have registered that 15% of their members apply trenches (this practice is used just in certain slope conditions); 95% practiced intercropping with coffee, beans and potatoes among other crops; 98% practiced mulching; 60% practiced manuring (this practice depends on livestock ownership); and 40% applied composting. In addition, it is important to mention that the soil erosion was reduced considerably, the soil fertility increased and the moisture in their soil and quantity of water sources also increased, satisfying their annual production requirements. According to DIFA staff the problems related with soil erosion and soil fertility were reduced in 80% of their members' plots. According to DIFA members the implementation of SAPs helped them maintain soil humidity; control weeds; maintain soil fertility; reduce pest and diseases; maximize the use of land (intercropping); improve food security; maximizing the use of their natural resources (zero-waste); reducing excessive drying from the solar radiation and reducing soil erosion.

Regarding activities and services DIFA's SACCO currently manages 150 members' loans and indirect loans through revolving schemes managed by the VFGs. The information dissemination service is strengthened with the creation of more than 23 demonstration projects related to the production of local and high demand seeds, water-harvest infrastructure, SAPs and food security projects (small gardens for vegetable production). Through collective marketing services, DIFA has linked member produce with international buyers ensuring transactions of almost 30 tons of bananas to Europe and United Kingdom in the last two years.

By 2016, DIFA had achieved a close relation with eight different research institutes, NGOs and government extension services. These organizations provide technical information, scientific knowledge and materials to improve the productivity and market access of their members. Among the external support actors who collaborate with DIFA are: the Masaka Diocesan Development Organization, World-vision, the National Agricultural Research Organization in Uganda, the National Agricultural Advisory Services of Uganda, Biodiversity, the Rakai Counselors' Association, Makerere University, and the International Institute of Tropical Agriculture.

Challenges

Despite the relative success that DIFA has experienced over the last 15 years, there are several recognized challenges that are affecting the organization performance. NAADs provide information and input to the farmers without cost. This service provision offered by NAADs, reduces the rates of collaboration and participation of DIFA's members. However, the projects promoted by NAADs failed due to the lack of constant input supply, lack of monitoring and lack of commitment of the beneficiaries.

Another challenge is that the human and social capital created through DIFA activities and services is used by political campaigns. This situation provokes organizational leaders to renounce to DIFA membership in order to occupy a district governmental position. In addition, this situation creates an image of DIFA as a governmental platform for political campaigns. However, DIFA has emphasized the disassociation from the government. Factors that are preventing the organization from providing better services to improve the agricultural sustainability include: lack of knowledge, technology and money necessary to apply enough SAPs in order to make the transition from subsistence to commercial farming. In addition, the

lack of national market regulations does not help to incentivize the environmental friendly production of bananas in the country. Finally, the lack of financial capital of DIFA make difficult to buy the members' production and provide storage and processing facilities that would give an added value to produce.

Aside from the NAADs trainings, the government does not support any of DIFA's activities. In fact, six months ago, DIFA received a grant from the Japanese government in order to make the necessary investments in infrastructure, trainings and other aspects to increase their membership and the service provision on SAPs and collective marketing, but the national government opposed and cancel the agreement arguing that this kind of grants have to be invested through the ministry of trade, industry and cooperatives. Therefore, in this case the governmental is not helping the organization development.

5.1.2.2 Case study two: KOPGA/KOPGT

Introduction

Kalangala Oil Palm Growers Association (KOPGA) and Kalangala Oil Palm Growers Trust (KOPGT) are part of the Public-Private-Producers Partnership (PPPP) introduced by the Vegetable Oil Development Project (VODP) in Kalangala, Uganda in the 1990's. The VODP was the result of the Uganda government initiative to accelerate the agricultural transformation from subsistence to commercialized production and to have a viable industrialized agricultural sector taking advantage of the natural resources and weather conditions of the country in order to meet the domestic and regional markets. Extensive research and studies proved profitability and feasibility for the palm oil production and its effect to mitigate poverty in Bugala Island in Kalangala district. In 1997, the Ugandan government presented a proposal to the International Fund for Agricultural Development (IFAD) to finance the project. In 2006, an agreement between the Government of Uganda (GOU) and IFAD approved a 15 million-dollar loan to finance the project. Six years later, Oil Palm Uganda Limited (OPUL), a private investor, was added to the project in order to development the oil palm plantations and oil processing. That same year, VODP decided to add an intermediary between palm growers, OPUL and GOU. The functions of this intermediary were to provide credit for growers; provide extension services for the sustainable production of the plantations; create marketing services; pay back the IFAD loan and to have a 10% shareholding of the project. This intermediary is known as KOPGT. After formal registration of KOPGT, the activities of palm oil production in Kalangala district officially began.

At the KOPGT general annual meeting on December 2007, palm growers resolved to establish their own farmer's organization, managed, operated and controlled by them, due to the fact that KOPGT was controlled in a certain degree by the GOU. The association would present the issues and concerns of the smallholder farmers. In 2009, KOPGA was officially registered and in 2010 a memorandum of understanding between KOPGT and KOPGA was signed in order to govern the relationship between the two organizations and make a complete transition of responsibilities from KOPGT to KOPGA by 2018. By 2016, 100% of the palm growers are registered as KOPGA members representing around 1,770 farmers in twenty-three units, seven blocks and one board of directors. KOPGA provides a voice for the farmers and represents a platform for participating in other dialogues and conversations between the KOPGT committees, IFAD and the Uganda Cooperative Alliance (UCA) whose vision is to become

KOPGA a sustainable new generation cooperative by 2018. KOPGA also provides multiple technical and social services that include trainings, loan appraisals; inputs requisitions; plantation best practices supervision; alternative financial services for growers; collaboration and support for HIV/AIDS prevention and treatment , and the organization of activities surrounding issue that pertain to youth, gender, environment and governance. In parallel to the examples mentioned above, KOPGT provides important services such as: environmental friendly production information/training services; logistics, marketing and inputs provision to the KOPGA members.

After ten years of operations, VODP now represent a successful shift from subsisting fishing and farming to sustainable commercial model that has transformed the local life patterns and cultural paradigms; cultivating 4,300 hectares for palm oil production and improving the living conditions of the island population.

Perception, justification and autonomy

The development of the VODP is a result of the profitability and feasibility of palm oil production and its effect to mitigate poverty on the island of Bugala. The creation of KOPGT was out of the necessity to administer the loans facilitated to the oil palm farmers to start with the palm production on the island. In 2006, IFAD suggested to create a trust organization that could perform these functions and having external representatives on its management board. KOPGT was legally registered under a Trustee Act and was operational in 2006 as an intermediary working with OPUL on behalf of smallholder famers providing them technical support.

In 2007 palm growers of the island of Bugala, decided to create their own farmer association, in order to have their own voice and take over the functions that were previously performed by KOPGT. According to the general manager of KOPGT, *“...the farmers were not in a leadership position at the beginning of the project, the mandate of the trust was therefore to represent the farmers’ interests and also to mobilize, register and train them to participate in the scheme. This was initially, but the horizon of the project had to change because of the scale of the activities was very broad, and include various logistics, documentation, finance management, credit management and TI.”* (Interview with Nelson Basaalidde, 30.05.2016).

The main objectives established in the 2009 KOPGA were:

- To ensure that palm growers apply best farming practices as recommended by OPUL.
- To conserve and preserve the environment by planting trees, reserving forest areas and ecosystems around lakes, streams, river banks, swamps and wetlands.
- To alleviate hunger and poverty through sustainable agriculture, management of natural resources and rural development.
- Represent palm growers in all the committees established by the GOU.
- Represent palm growers in obtaining correct sales prices for palm oil fruit.
- Ensure the availability of extension services and technical training to palm growers.
- Ensure that the loan of the palm growers’ scheme is repaid as required by the financing services.
- Collaborate and create agreements with GOU, and other organizations that promote the interests and objectives of the association.

- To improve the welfare of the palm growers and their families by promoting their best.

Since the creation of KOPGA, IFAD and GOU have facilitated the conditions to make the transition of KOPGT functions and responsibilities to KOPGA. The main goal is that KOPGA take over 100% of KOPGT functions by 2018.

Services provided

KOPGA/KOPGT main goals have been to facilitate and create the conditions in the palm fruit production process to satisfy OPUL demand, complying with OPUL and the National Environment Management Authority (NEMA) production norms and standards. In order to accomplish these conditions, KOPGT/KOPGA has been working in different areas to provide services to palm growers.

Smallholder mobilization, information and training services. In collaboration with the local district government, KOPGT identified potential palm oil farmers, registered and organized them into groups, coordinated land surveys and the consolidation of land parcels, providing all the necessary inputs. Through its operational department, KOPGT provides on-farm technical support, guidance, and supervision and extension services such as land preparation, planting, maintenance and SAPs implementation (intercropping, mulching, cover crops and creation of buffer zones that prevent agro-chemical pollution on the Victoria Lake and Bugala Island groundwater). Part of the function of the KOPGT operational officers is to ensure the quality of the production through a grading system; to ensure SAPs implementation in the growers' plots through the Impact Monitoring System committee (IMS) which follows the norms and rules of the NEMA; to transparently inform about the monthly price of the palm fruit calculated in the price committee; and provide information about the inputs and services cost through the service cost panel committee.

Credit and loan services. Since the beginning VODP calculated that palm oil growers would need a five-year credit to make financially self-sustainable the palm production until reach the harvest period. Such inputs involved to pay the labor required for activities such as land preparation, planting, maintenance and implementation of SAPs. Therefore, it was decided that the function of KOPGT was to create the financial and physical access between the farmers and OPUL and to manage the oil palm development loan facility from IFAD for palm oil growers. KOPGT deducts a loan recovery amount directly from the farmers' income as soon as OPUL paid farmers for their harvest. This system insures 100% loan recovery. In addition, KOPGT helped farmers to obtain a bank account where her/his money is directly credited after all the deductions have been deducted. Meanwhile, KOPGA complemented the financial services by providing farmers mobilization, loan appraisals, recommendation for the growers and creating alternative financial services for palm growers as their own SACCO.

Collective marketing and logistics services. The most important function of KOPGT is to provide delivery services for all the agrochemical inputs and seedlings needed by the palm growers including the transportation of fresh fruit bunch collected from the farmers to the OPUL mill for oil extraction. Even though, that OPUL was established as the only buyer of

the palm growers produce, the collection and selling services of the palm fruits is provided by KOPGT and the farmer organization is provided by KOPGA.

Representativeness. KOPGA play an important role representing the farmers' voice and concerns, electing 6 leaders that are part of the KOPGT manager board integrated by 11 members from different external institutions and organizations. In addition, KOPGA and KOPGT represent the farmers' interest in the environmental, pricing and service cost committees. At the same time, KOPGA/KOPGT leaders are working together with IFAD and UCA to restructure KOPGA and transform it into a sustainable new generation cooperative, capable to take over KOPGT functions and services by 2018.

External support and information access

IFAD financial and technical support, OPUL production expertise and GOU legal environment have been crucial determinants for KOPGA/KOPGT creation and the successful services provision to its members. IFAD was the trigger actor who decided to facilitate a loan to VODP in order to finance the operation of a big-scale agricultural production on the island of Bugala. IFAD loans have helped make investments in infrastructure such as trucks, roads, offices and provide to the palm growers five-years loans that cover the operation cost of the farmers who decided to join at the VODP. These operational loans included land preparation, planting, maintenance and SAPs implementation before the first harvest year. In addition, it was through IFAD advice that VODP decided to create KOPGT as an intermediary between the farmers and OPUL and provide the services required to make a sustainable production of palm fruits. In 2007, IFAD also suggested to hear the farmers complains and promote the creation of KOPGA, as a farmer association that could give voice and perform KOPGT functions with complete autonomy. IFAD finance and technical support is planned to end in 2018.

Aside from purchasing the oil and fruit production from KOPGA members, OPUL has helped to create the conditions to ensure a suitable production of palm oil from the island of Bugala. In order to do the latter, the first years of the VODP, OPUL provided the technical expertise and disseminate the necessary information to establish the plantations on the smallholders' farms. OPUL has provided the expertise involved in establishing oil palm nurseries; creating demonstration plots, to providing information for land management land services and inputs to KOPGT/KOPGA, to ensure the success of establishment, sustainable management and maintenance of oil palm by the smallholders.

The Government of Uganda, operating through the Ministry of Agriculture and Animal Industries and Fisheries (MAAIF) took the responsibility to provide and facilitate the legal requirements and documentation for the project in accordance with all the environmental guidelines defined by NEMA. The government facilitated the formation of KOPGT, loans to the palm growers and the creation of the KOPGA and its SACCO. At the same time, the government created the infrastructure necessary throughout the island and coordinated the negotiations between KOPGT committees and different ministries to guarantee the transparent compliance of national norms and standards.

Regarding access to SAPs information it is important to mention that OPUL has put in place environmental management system in order to identify, share information and control the

environmental impact of its activities, to continually improve its environmental performance and together with palm growers implement a systematic approach to setting environmental objectives.

Size, inclusiveness and rules

Due to VODP economic approach, KOPGA membership is open to all people in Uganda who wants to become a palm grower in the district of Kalangala. Every member has to pay a membership and annual subscription fee. Nowadays, the KOPGA membership consist of 1,770 35% of which are women and 720 of the total members are already in the harvesting period (fifth year after the palm plantation). Despite the flexible requirements to become a KOPGA member, Bugala Island is considered one of the most marginalized regions in Uganda and it was complicated to find farmers who complied with the legal land tenure documents to participate in VODP. In addition, more than 60% of KOPGA members are 35 years old and younger, 5% of them own less than one hectare of land, 10% cannot read and 14% have a high school or higher school certification or diploma. KOPGA social inclusiveness has been complicated to achieve. Despite the fact that KOPGA was created as a solution to satisfy the farmer's needs, the lack of experience and education of their members created a group dynamic without enough cohesion and skills to start the takeover process of KOPGT functions. However, UCA has collaborated to create the organizational structure and democratic mechanism to represent all the voices inside the KOPGA membership in order to provide the function and services that their members and the VODP require.

Regarding SAPs production rules and sanctions, KOPGA members are required to comply with certain production rules in order to sell their product to OPUL. The rules insure the standardization of the production process, SAPs implementation and inputs used by all the palm growers. Among the most important rules identified are: the use of specific chemical fertilizers; the implementation of intercropping; mulching and cover crops and the creation and protection of buffer zones and forested protected areas that absorb the agro-chemical residuals. All these rules are aligned with NEMA environment measures and the impact monitoring system committee. The organizational structure and functions of KOPGA/KOPGT were designed to provide information and monitor the members' behavior in regard to the norms.

Leadership and governance structure

Any KOPGA member can occupy a leadership position in the organizational structure as long as the assembly considers that he/she has the skills and the potential to satisfy the position. It is important to mention that all the leadership positions are executed on a volunteer basis, without salary or in-kind compensation. KOPGA leaders provide constant in-situ monitoring of the compliance of their members in the SAPs, input management and loan re-payment compliance. As it was explained before, the education level is an important determinant to consider amongst their members due to the skills required to manage an important farmer association that provides important services, interacting with high level managers and government representatives and generating revenues to pay the IFAD loan. As a result of the low education and poverty levels of the island it has been complicated to find enough leaders that satisfy the necessary skills to manage it. Therefore, small-privilege group control problem (elite capture), could represent a risk factor for the KOPGA leadership and governance structure that can affect the quantity and quality of its service provision in the future. This lack of leaders with enough skills and

knowledge already create a situation where OPUL and GOU take all the decision regarding the services necessities to provide to the farmers.

KOPGA members are organized in 23 different production “units”, each unit represents a particular community within the island of Bugala. At the same time, four communities integrate a production “block”. Every unit and block has five representatives integrated by a chairperson, a vice-chairperson, a general secretary, a secretary of finance and a secretary of publicity. Finally, the KOPGA structure has a board of directors integrated by 11 leaders, where six of them are chairman representatives of each block and the rest have the other leader positions. The KOPGA structure helps to mobilize their members, organize collective activities, supervise the loan payments, disseminate information, and provide the flow of communication of main concerns and bureaucracy activities between the farmers, KOPGT and OPUL. Finally, KOPGA general assembly is formed by 1,770 members who meet once a year to take relevant decisions and elect their leaders democratically on the basis of the principle of “one member one vote”. KOPGA general meeting came to the conclusion to create a SACCO in order to diversify their financial resources mechanism, invest in their plots and solve their monetary constrains. Without a doubt, KOPGA structure is an important factor for the coordination of logistics and services that ensure the farmers production.

On the other hand, KOPGT is integrated by a management board, three committees and 29 employees. The KOPGT board is integrated by 11 members including a general director from NARO, a VODP coordinator, two representatives of the district local council, one representative from MAAIF, one from ministry of finance, one from ministry of Justice, one from one non-governmental organization and three KOPGA representatives. KOPGT board members hold meetings every three months including an annual general meeting.

KOPGT employees are responsible for organizing and providing all the services and functions to ensure the production and the tripartite contract between GOU, OPUL and palm growers. The KOPGT management is integrated by a general manager; an operational manager, who is in charge of extension officers that provide the technical expertise, trainings, information and satisfy the logistic requirements to supply inputs and collect the produce; the credit manager, who is in charge of organize all the loans and re-payment schemes of the farmers; and a finance manager, who is in charge of creating the conditions for the profitability of the project. The KOPGT established three committees, to discuss relevant topics for the VODP success. The IMS committee is in charge defining, monitoring and supervising all agricultural practices implemented by KOPGA and OPUL verifying the compliance of NEMA standards. The service cost panel committee provides information and calculate the cost of inputs and services provided to KOPGA members. Finally, the oil palm pricing committee has the responsibility to provide the information and calculate the monthly price of the palm fruit paid to KOPGA members.

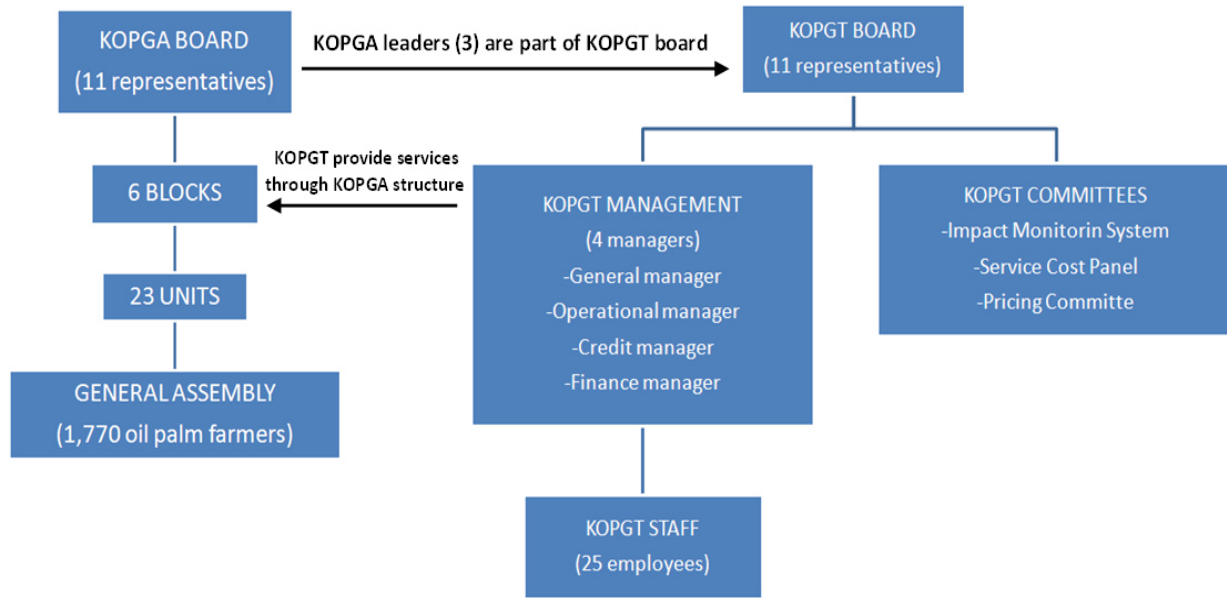


Figure 10. KOPGA/KOPGT relation and organization structure.

Source: Author's creation from KOPGA/KOPGT interviews.

Current situation

Despite the challenges of the KOPGA takeover of KOPGT functions, the most important achievement mentioned by KOPGA members, KOPGT staff and outsiders is the high level of coordination and collaboration between three different actors (GOU, OPUL and KOPGT/KOPGA partnership) making possible a successful change of old life patterns and culture paradigms to transform 1,770 nomadic fishermen and subsistence farmers into a sustainable commercial farmers in just a 10 years period (from 2006 to 2016). This project represents valuable lessons learned related with the adoption of agricultural innovations. The Bugala Island experience suggests that if you can modify the behavior of fishermen to convert them into commercial farmers producing a new commodity and adopting innovative and specialized inputs and agricultural practices; you can make any famer can adopt any innovative sustainable agricultural practice to improve their farm system.

The IFAD technical and financial support will continue until 2018. Their main goal is to leave a strong palm grower association that can run the functions and services provided by KOPGT. The legal environment provided by government to run the VODP and the willingness of OPUL to expand their processing capacity are necessary for the continuity of the social and economic development of the Kalangala district. The living standards of the island population have improved considerably, due to the creation of infrastructure, roads, electricity, transportation, education and health services to the local population as result of the government investments. Despite that the soil and wheather conditions on Bugala island do not ensure a 100% productivity standards as the main producers of palm oil such as Malaysia and Indonesia, nowadays, the Bugala farmers are producing enough palm fruits to run the OPUL mill and process around 20 tons of palm fruit per hour, twenty-four hours a day, during the whole year. This production capacity represented sales of 20 million dollars of crude palm oil in the last year. With the inauguration of a second mill in June 2016, it is expected that Kalangala Island

will be able to satisfy the demands of the internal and regional oil market and eliminate the national dependency from Malaysian and Indonesian oil imports.

By 2016, Bugala Island had already reached the maximum environmentally-recommended land use for palm production (6,450 has. produced by the private company and 4,300 has. produced by smallholders). This growth enabled 1,770 farmers to engage in oil palm production and receive trainings, and low interest credits to invest in the palm production and generate capacities in the farmers to create their own association and SACCO that satisfy their financial requirements. Regarding the implementation of SAPs, KOPGT staff have registered that 45% practiced intercropping with self-consumption crops; 70% practiced mulching; and 15% implement cover crops. Intercropping and cover crop practices are restricted to crops that cannot consume the fertilizer applied to the palm trees. In addition, VODP ensures that the project complies with NEMA standards and certifications that ensure the protection of the environment and the sustainable management of the natural resources of the island. The results of KOPGT/KOPGA collaboration generated enough incentives to the palm growers' through inputs, know-how, extension services, and more stable prices with a pricing committee, self-help organization, collective action and financial mechanisms to ensure the adoption of SAPs in the palm production system.

Challenges

The main challenge facing the VODP project is related to the bad publicity generated by social and environmental NGOs that accused GOU of land grabbing, displacing people especially the elderly without any compensation. The bad propaganda is also related to environmental impacts. The NGOs argue that water pollution and soil degradation are results of excessive fertilizer consumption in the palm gardens and lack of interest to make the palm production more environmental friendly. Regardless this issue, KOPGT/KOPGA have identified that more knowledge and means (financial capital) are necessary to provide more SAPs services and respond to the bad propaganda generated by the NGOs. According to different palm growers, the cost of SAPs implementation reduces their profits. This situation generates additional request for more credits and loans to KOPGT, extending their financing dependency for more years.

Another important challenge that KOPGA has to overcome is the lack of cohesion, leadership and capabilities in their members to make a successful transition to take over the KOPGT functions and cope with the tripartite partnership agreement. KOPGA main social capital problems are related with the lack of attendance meetings and trainings; members' historical mistrust in the government and private sector; and members' dependency syndrome towards receiving support from external actors. In addition, there exists the risk of elite capture by KOPGA leaders or KOPGT managers if they decided to fusion KOPGA/KOPGT structure without any significant farmer empowerment. Therefore, the transformation of KOPGA into a sustainable new generation cooperative is a priority of VODP, IFAD and UCA in order to make a sustainable service delivery to their members. Without a doubt, the KOPGA take over process and the lack of scientific facts to argue the bad publicity generated by NGOs are the two main factors that create an unstable environment to maintain the Bugala project and KOPGA/KOPGT services provision to ensure the production and the SAPs implementation for the next years.

Chapter VI Conclusions and recommendations

6.1 Summary

Sustainable agricultural practices are crucial to reduce soil degradation, soil erosion, water depletion and lack of moisture in the crops, improving productivity, reducing poverty, inequality and food insecurity that affects millions of households in Uganda. This study analyzed the role of agricultural cooperatives and farmer organizations on the SAPs adoption in Uganda. The study used quantitative and qualitative data in order to identify which organization functions and features influenced the number of SAPs services provided to their members. The study approach used different variables that defined successful collective action and business organizations and correlating their influence with the number of SAPs services provided. Using information from ninety-nine surveys, a Poisson regression model analyzed correlations of different variables with the number of SAPs services provided. Two case studies were presented as a description of two agricultural organizations main functions, features and their SAPs service provision situation.

The results of the statistical model show that five organizational determinants influenced, on a significant level, the probability to offer a higher number of SAPs services to its members. This implies that the null hypothesis which states that there is no significant relationship between the number of SAPs services provided by Agri-coops and FOs and their internal functions and features was rejected. The results show that the organizations who have more information access; who received more external support; who are autonomous; with a bigger membership size and whose leaders' have a higher perception of soil and water problems in the members' farms; are more likely to provide a higher number of SAPs services. These findings suggest that awareness of the farmer organization leaders is crucial in order that their organizations be able to identify their problems and provide solutions through the use of SAPs services. In addition, the results imply the necessity to create stronger networks between farmer organizations and governments, NGOs, research institutes and private companies in order to improve the information access, knowledge, tools and means that can trigger the SAPs service provision and adoption. The results also show the importance to create independent organizations that have the freedom in their creation and decision making in order to identify, prioritize and solve their own problems through their own services provision. Finally, the membership size factor suggests that successful organizations that provided benefits (social, economic and/or environmental) to their members will growth and will provide more SAPs services.

The results of the qualitative analysis helped to confirm, expand and describe the determinants and the context under which farmer organizations have to deal in order to be a successful service provision to ensure the SAPs adoption among their members. The case studies show how the perception of a common problem that can be the initial trigger to establish a self-help autonomous organization. Received external support from different organizations and institutions provided access to knowledge and financial capital to establish the information and finance services through their members. These services were fundamental to solve the productivity problems and ensure the adoption of agricultural innovations on its members. It is

important to highlight that not only the decision to use information services for the SAPs adoption, but also the decision to use different tools and materials to disseminate the knowledge was fundamental to improve the adoption rates amongst farmers. At the same time, the finance services strategy, created a revolving loans schemes and their own SACCO, allowing its members to have access to low interest rates loans and credits necessary to invest in the SAPs implementation. The social capital through the reputation of their members and leaders created an important situation to generate an environment of trust and collaboration among the farmers. This environment was important in order to monitor and supervise the behavior of the members regarding the SAPs implementation; credit repayment and create trainings and collective activities to implement different SAPs. The governance structure was designed to achieve the purpose and justification of the organization. Therefore, each committee has specific functions to ensure the service provision for the SAPs adoption. In addition, the social structures such as the VFGs, units and blocks are important to ensure an efficient service provision of the organization. The compliance with specific internal production rules and the national and district environmental standards provide a regulatory framework that ensures that all the leaders of the organization have a clear vision of the type of services to provide and the technologies to promote. The leadership skills such as the experience solving the soil and water problems; helping others are fundamental to share the information and comply with the organization objectives. The difference in membership size between the two cases suggests the necessity to reach an optimum member size where is necessary to balance the cost of the service provision with their quality and quantity. Finally, the inclusiveness in membership confirms the hypothesis that social diversity in membership increases the range of strategies to use to improve the service provision. However, it is necessary to have homogenous organizational objectives in order to identify problems and to find the proper solutions.

6.2 Recommendations

In order to improve the SAPs service provision of Agri-coops and FOs in Uganda, it is necessary that the government facilitate the conditions and incentives to create organizations with complete autonomy based on a clear justification identified by their members. In addition, it is important that government provide a solid legal framework and incentives that allow that these types of organizations establish relations with NGOs, research institutes and extension services that can provide specialized knowledge, materials and means to satisfy the farmers' organization's needs. The creation of stronger national environmental rules and regulations and its monitoring would increase farmer organizations' awareness to establish more and better services related with SAPs. It is also important that the government control the market mechanism and create economic incentives and agri-environmental collective schemes in order to promote the production of agricultural commodities and ecological services in Ugandan farmers' organizations. In addition, is important that national governments start to create collective contracts of watershed management in order to increase the efficiency of the in the results to achieve. Finally, it is necessary that the government promote the creation of SACCOs due to the important role they play through providing the financial capital required to invest in SAPs promoted by the farmer organizations.

The Agri-coops and FOs need to establish clear bylaws that define the specific objectives related with self-help and business activities to reach their justification. The bylaws of the organization have to establish specific rules and sanctions to ensure the member compliance

with specific SAPs. The farmer organizations have to be completely autonomous from any external actor in order to design their own organizational structures and make their own decisions in order to reach their objectives. The governance structure has to have at least one committee in charge of agri-environmental issues; other committee specialized to provide financial support and invest in the SAPs implementation; at the same time, it has to have collective marketing power to sell their commodities and ensure the economic sustainability of the organization. This economic sustainability will play an important role to solve the problem of the 78% of the organizations in the CLE survey that mention the lack of means (lack of finance and funds mostly) as the main factor to provide SAPs services. Besides, it is important to create a structure where social capital can play a role to create the trust and collaborative environment to monitor, supervise and organize collective activities among their members. The strengthening of their external support networks will provide information knowledge, trainings and financial support that Agri-coops and FOs require to provide their services and solve the problems of 31% of the organizations that participated in the CLE and identified as the cause to prevent their members to adopt SAPs. The access to information plays an important role in establishing new organizations providing awareness to farmers in order that they can identify the common problems that they want to solve and the strategies that they want to use to solve them. At the same time, by strengthening the external support networks can provide enough information and means to improve the service provision; leadership skills; and governance structure of the organization. In addition, it is important that the information sources will also provide tools to the farmer organizations to improve the learning efficiency among the members. These networks can also help to provide standards and certifications to the organization and improve their marketing performance. Leadership skills also are important for organizational cohesion, creation of networks and for defining the vision necessary to run the organization. The inclusiveness characteristic will help the organization to collect different points of view and to take better decisions.

Finally, it is important to mention the necessity to shift the “new cooperative model” to a “holistic cooperative model” that can balance the economic, social and environmental activities of the farmer organizations. It is hard to believe taking into account the current conditions of the natural resources of Uganda, just 8.1% of the organizations that participated in the CLE answered that one of its main purposes is to have a better management of the natural resources and just 6% of the organizations answered environmental sustainability as the main priority. The paradox of the organizations that focus on the production, marketing and economic growth, is that without a sustainable management of their natural resources the organization will not be able to guarantee the production and marketing in the future. In fact, the paradigm of the economic growth approach is one of the causes of the climate change and the environmental degradation problems that the planet is facing today. Even in the International Cooperative Alliance website, the presentation of the seven cooperative principles the “last” and the “shortest” only mentions that *“Co-operatives work for the sustainable development of their communities through policies approved by their members.”* (ICA, 2016). The study suggest to push the Agri-coops and FOs movement a step forward and adapt them to the problems that human civilization is facing today. Therefore, it is necessary to balance the three pillars of the sustainable development; social, economic and environmental; and create the necessary conditions, incentives and activities in order to shift these organizations into holistic

organizations that can contribute to solving the inequality, poverty, food insecurity and environmental degradation problems of their farmers.

*“When the last tree is cut down, the last fish eaten and the last stream poisoned, you will realize that you cannot eat money”
(Native American saying).*

6.3 Future research

Due to financial and time constraints, it was not possible to visit in the field the 99 organizations and physical inspect the quality and quantity of the sustainable agricultural practices implemented. Despite that the survey was applied during the largest Agri-coops and FOs meeting in the history of the Uganda, it is necessary to generate representative information of these organizations in the country. Therefore, it is important to expand the results of this study and evaluate the efficiency of the organization SAPs service provision and the adoption rates amongst the members. In addition, is important to generate more research focusing on the government free-cost agricultural extension services and its influence in the decrease of farmers' membership in Agri-coops and FOs organizations. It is also important to generate information of successful farmer organizations and agricultural cooperatives that balanced the social, economic and environmental goals and identify the determinants of their success.

6.4 Declaration of originality

I hereby declare that the present thesis has not been submitted as a part of any other examination procedure and has been independently written. All passages, including those from the internet, which were used directly or in modified form, especially those sources using text, graphs, charts or pictures, are indicated as such. I realize that an infringement of these principles which would amount to either an attempt of deception or deceit will lead to the institution of proceedings against myself.



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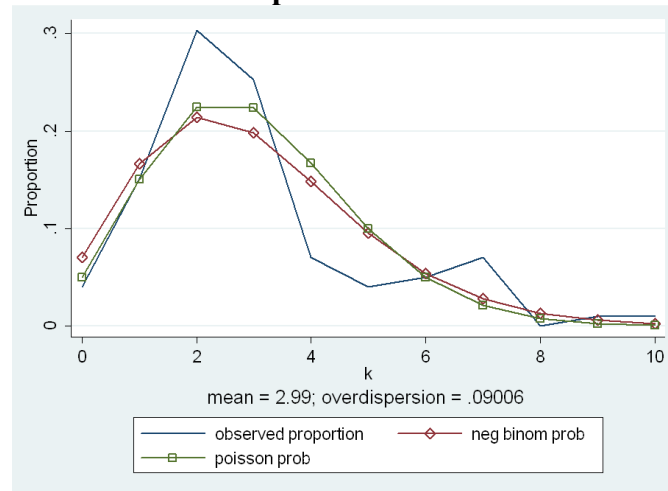
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Appendixes

Appendix 1. Observed and expected outcomes of Poisson distribution.



Appendix 2. Calculation of variable values.

Variable	Value calculation
PERC	Average answer value from the following questions: 1.-Are most of your members facing problems due to poor soil fertility? 2.-Are most of your members facing problems due to soil erosion? 3.-Are most of your members facing problems due to water scarcity? 4.-Are most of your members facing problems due to water pollution? Possible answers for each question: 0, do not know; 1, not a problem; 2, small problem; 3, big problem.
1.BMTD	Have any of the board members been trained or received professional advice on SAPs? Possible answers: 0, No; 1, Yes.
1.INFO	Was the organization using any ICT platform at the start? Possible answers: 0, No; 1, Yes.
1.RULE	Can the organization reject farmers' supplies or sanction farmers if they do not comply with standard or accepted SAPs? Possible answers: 0, No; 1, Yes.
INCL	Inclusiveness ratio= number of women, young, smallholders and illiterates members divided by the total number of members.
SOCA	Sum of the answers values from the following questions: 1.-Disagreements, tensions and disputes during board meeting have: 2.-Disagreements, tensions and disputes during general assemblies have: 3.-Disagreements, tensions and disputes among ordinary members: 4.-Disagreements, tensions and disputes between ordinary members and leaders have: Possible answers for each question: 0, Significantly increased over time; 1, Stayed more or less the same over time; 2, Significantly decreased over time.
EXSU	Sum of the answers values from the following questions: 1.-Did you organization receive any grant to establish itself? 2.-Has your organization received any grant over the past 12 months? 3.-Has your organization benefited from any credit or investment to establish itself? 4.-Has your organization benefited from any credit or investment over the past 12 months? Possible answers for each question: 0, No; 1, Yes.
LEAD	Number of correct answers that each participant got in a test of hypothetical organization situations and leadership decisions. Maximum of correct answers 10.
JUST2	What was the main reason or objective for establishing the organization?

	Possible answers: 0, Marketing and adding value; 1, Access to better prices and services
JUST3	What was the main reason or objective for establishing the organization? Possible answers: 0, Marketing and adding value; 1, Self-help and management of natural resources.
SIZE	How many members had your organization at establishment?
AUTO	Sum of the answers values from the following questions: 1.-Who introduced the idea to establishing the organization? 2.-Who led the effort for establishing the organization? Possible answers for each question: 0, An outsider (from government, extension services, farmer union, NGOs, private company, etc); 1, Somebody who was, or still is, a member of the organization.
GOVE	Sum of the answers values from the following questions: 1.-Does your organization have a board of members (or board of directors)? 2.-Where the current board members elected democratically on the basis of the principle of "one member one vote"? 3.-Did the organization have and internal committee to discuss SAPs at the start? 4.-Did the organization have a manager since the start? Possible answers for each question: 0, No; 1, Yes.

Appendix 3. Poisson regression model results.

Poisson regression model	
	Number of obs.=73
	LR chi2(13)=33.05
	Prob. > chi2 =0.0017
	Pseudo R2=0.1162
	Log likelihood=-125.72305

NOS	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
PERC	0.359125	0.1484571	2.42	0.016	0.0681545	0.6500955
1.BMTD	0.1085663	0.1706096	0.64	0.525	-0.2258224	0.4429549
1.INFO	0.6305729	0.2010088	3.14	0.002	0.2366029	1.024543
1.RULE	0.2196744	0.1965849	1.12	0.264	-0.1656249	0.6049737
INCL	0.3252394	0.4225847	0.77	0.442	-0.5030113	1.15349
SOCA	0.0012762	0.0376417	0.03	0.973	-0.0725001	0.0750525
EXSU	0.136143	0.060459	2.25	0.024	0.0176456	0.2546405
LEAD	0.0769563	0.0597299	1.29	0.198	-0.0401123	0.1940248
JUST2	-0.1491814	0.1955712	-0.76	0.446	-0.5324938	0.2341311
JUST3	0.1068413	0.1958539	0.55	0.585	-0.2770253	0.490708
SIZE	0.0001718	0.00009	1.91	0.056	-4.57E-06	0.0003482
AUTO	0.1660125	0.0975384	1.7	0.089	-0.0251593	0.3571842
GOVE	-0.1400051	0.0983917	-1.42	0.155	-0.3328493	0.0528392
_cons	-0.6779782	0.5290719	-1.28	0.2	-1.71494	0.3589836

Appendix 4. Deviance and Person test results.

Deviance test	
Goodness-of-fit chi2=	51.57452
Prob. > chi2(59)=	0.743

Pearson Goodness of-fit test	
Goodness-of-fit chi2=	49.50307
Prob. > chi2(59)=	0.8062

Appendix 5. Correlation matrix.

Correlation matrix of coefficients of Poisson model														
	PERC	BMTD	INFO	RULE	INCL	SOCA	EXSU	LEAD	JUST	JUST	SIZE	AUTO	GOVE	_cons
PERC	1.00													
1.BMTD	0.04	1.00												
1.INFO	0.10	-0.03	1.00											
1.RULE	-0.06	-0.11	-0.02	1.00										
INCL	-0.08	-0.12	0.10	0.02	1.00									
SOCA	-0.05	-0.21	0.13	0.02	0.06	1.00								
EXSU	-0.07	-0.07	-0.06	0.05	0.05	0.00	1.00							
LEAD	-0.05	-0.09	0.15	-0.18	0.04	0.21	-0.18	1.00						
2.JUST	0.03	0.07	-0.21	0.06	-0.13	-0.13	0.08	-0.11	1.00					
3.JUST	0.03	-0.03	-0.11	0.26	0.03	0.00	0.03	-0.20	0.24	1.00				
SIZE	0.12	0.08	0.14	-0.12	0.11	0.11	-0.19	0.18	0.11	0.08	1.00			
AUTO	0.00	0.11	0.24	-0.05	-0.05	-0.14	-0.02	0.10	0.09	-0.07	0.17	1.00		
GOVE	-0.22	0.08	-0.14	-0.06	0.01	-0.18	-0.23	0.11	-0.02	-0.08	-0.10	-0.12	1.00	
_cons	-0.35	-0.09	0.21	0.11	0.32	-0.25	0.09	-0.56	0.03	-0.06	-0.32	-0.19	-0.19	1.00

Appendix 6. Poisson regression robust model results.

Poisson regression robust model	
	Number of obs.=73
	Wald chi2(13)=75.17
	Prob. > chi2 =0.0000
	Pseudo R2=0.1162
	Log likelihood=-125.723

NOS	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
PERC	0.359125	0.1126081	3.19	0.001	0.1384171	0.5798329

1.BMTD	0.1085663	0.153894	0.71	0.481	-0.1930605	0.410193
1.INFO	0.6305729	0.2143782	2.94	0.003	0.2103994	1.050746
1.RULE	0.2196744	0.1365914	1.61	0.108	-0.0480399	0.4873886
INCL	0.3252394	0.4227823	0.77	0.442	-0.5033987	1.153878
SOCA	0.0012762	0.0340497	0.04	0.97	-0.0654601	0.0680124
EXSU	0.136143	0.0580167	2.35	0.019	0.0224323	0.2498538
LEAD	0.0769563	0.0400068	1.92	0.054	-0.0014557	0.1553682
JUST2	-0.1491814	0.2027029	-0.74	0.462	-0.5464718	0.248109
JUST3	0.1068413	0.1289024	0.83	0.407	-0.1458027	0.3594854
SIZE	0.0001718	0.0000832	2.07	0.039	8.80E-06	0.0003349
AUTO	0.1660125	0.0911482	1.82	0.069	-0.0126347	0.3446596
GOVE	-0.1400051	0.0627936	-2.23	0.026	-0.2630783	-0.0169319
_cons	-0.6779782	0.3384989	-2	0.045	-1.341424	-0.0145325

Appendix 7. List of interviewed persons.

- Amana Gangue, Ddwaniro Integrated Farmers Association member, 8.06.2016.
- Daniel Birimuye, Ddwaniro Integrated Farmers Association Chairperson, 7.06.2016, 8.06.2016.
- David L., Kalangala district Agricultural manager, 02.06.2016.
- Dominique R., manager of the Oil Palm Union Ltd. Mill, 31.05.2016.
- Enoch L., Ddwaniro Integrated Farmers Association Technical officer, 7.06.2016, 8.06.2016.
- Franco T., field officer of Kalangala Oil Palm Growers Trust, 30.05.2016.
- Jonahantan S., block leader of Kalangala Oil Palm Growers Association, 01.06.2016.
- Joseph S., Kalangala Oil Palm Growers Association member, 02.06.2016.
- Joseph Sbbowa, Ddwaniro Integrated Farmers Association member, 7.06.2016.
- Josephine A., Kalangala Oil Palm Growers Association chairman, 31.05.2016
- Kaws A., Ddwaniro Integrated Farmers Association Village Farmer Group leader, 8.06.2016.
- Lumaga C., chairperson of the unit of Kalangala Oil Palm Growers Association, 02.06.2016.
- Maria Nacanebo, Ddwaniro Integrated Farmers Association member, 8.06.2016.
- Martin Lugambwa, Kalangala Oil Palm Growers Association chairman, 31.05.2016, 3.06.2016.
- Morris Bafiirawala, Environment manager of the Kalangala district, 01.06.2016.
- Naruge Maxe, Ddwaniro Integrated Farmers Association member, 8.06.2016.
- Nelson Basaalidde, general manager of Kalangala Oil Palm Growers Trust, 30.05.2016.
- Nelson T., credit manager of Kalangala Oil Palm Growers Trust, 01.06.2016.
- Saveri Sevame, Kalangala Oil Palm Growers Association member, 02.06.2016.
- Teresa W., unit leader of Kalangala Oil Palm Growers Association, 02.06.2016.

Appendix 8. Semi-structured questionnaire.

1. Who introduced the idea to establish the organization?
2. Who led the efforts for establishing the organization?

3. What was the main reason or objective for establishing the organization?
4. Has the organization achieved that initial objective?
5. What is the main objective of the organization today?
6. What position and functions do you have in your organization?
7. Are most of your members facing problems with soil and water degradation?
8. Which services was the organization established to provide?
9. Which services is your organization currently providing, with the intention to help members manage soil and water degradation problems?
10. Does your organization follow internal or external rules to comply regarding SAPs?
11. How is the organizational structure of your organization?
12. What are the requisites to become a member of your organization?
13. Has your organization faced disputes among members and leaders regarding natural resource management?
14. How is the current situation of soil and water resources on your members' farms?
15. What are the benefits of applying SAPs in your farms?
16. What is preventing your organization from providing more or better services to improve the implementation of SAPs?
17. What is preventing your members from adopting more or better services to improve agricultural sustainability farming practices?
18. Who are the institutions/organizations that you consider "friends" of your organization and how is your relationship? (Venn diagram tool).
19. How is the production process of your commodities produced? (Seasonal calendar tool).

Appendix 9. CLE in Uganda and field work pictures.